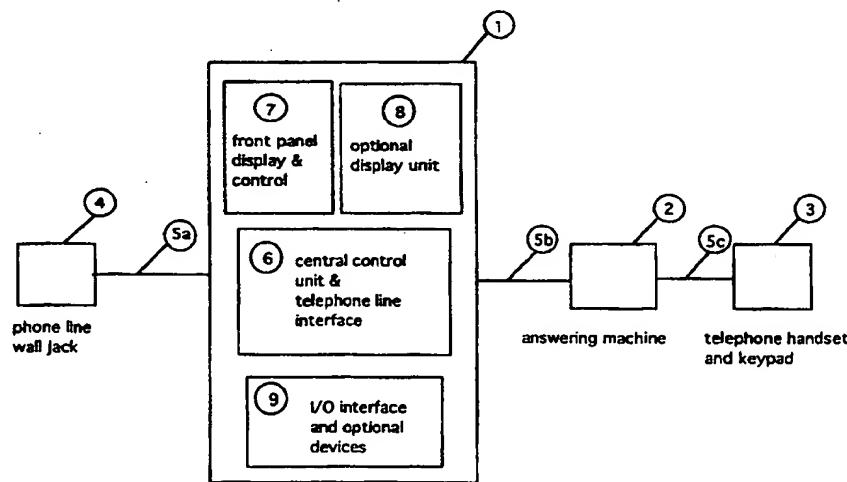




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(54) Title: EVER READY TELEPHONIC ANSWERING MACHINE FOR RECEIVING AND DELIVERING ELECTRONIC MESSAGES



connection of E-mail apparatus and telephone & answering machine

(57) Abstract

The present invention discloses a telephonic E-mail "answering machine" (1) for receiving, processing and storing electronic messages. The E-mail answering machine (1) includes a phone jack (4) for adapting to an existing telephone line for receiving electronic messages from the phone line. The telephonic apparatus further includes a processor (6) for responding to the electronic messages and for storing the messages in the answering machine (1). In another preferred embodiment, the telephonic E-mail answering machine (1) further includes an LCD display (8) for providing information to a user relating to a reception of the electronic messages.

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1

2 EVER READY TELEPHONIC ANSWERING-MACHINE FOR  
3 RECEIVING AND DELIVERING ELECTRONIC MESSAGES

4

5 BACKGROUND OF THE INVENTION

6

7 Field of the Invention

8 The present invention is generally related to  
9 systems for facilitating electronic messages over  
10 interconnected computer networks, and more particularly,  
11 a system for coordinating and delivering electronic mail  
12 messages directly to a novel device for sending and  
13 receiving electronic mail messages.

14

15 Description of the Prior Art

16 Even with rapid increase in the use of personal  
17 computers and computer networks, the benefits of  
18 electronic communications in the forms of electronic  
19 data (or messages) representing texts, images and sounds  
20 are still limited to very small percentage of the  
21 population. To the majority of people, the information  
22 highway is still too remote. In order to get on the  
23 'ramp' of the information highway, more sophisticate  
24 processes are required which may involve the use of  
25 computer and modem to 'log on' a local server, setting  
26 up an account, executing communications programs,  
27 sending and receiving messages, and download and upload  
28 files. To people in most households, even with a  
29 computer and a modem, these tasks are too complicate and  
30 not sufficiently 'user friendly'. Even if the  
31 technology and the systems are available, there are  
32 still many hurdles to overcome before most people can  
33 switch to an E-Mail communication mode. Ordinary people  
34 are not yet able to take advantage of the existing  
35 telephone systems and micro-processors or computers to  
36 routinely communicate with 'electronic mail' (E-Mail)  
37 for sending and receiving electronic messages.

38 The telephone system has been greatly enhanced and  
39 become a widely accepted communication apparatus in

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1 households and offices since its invention. The examples  
2 include the telephone answering system found in  
3 households, the voice mail system used in office  
4 environments. The telephone answering system, including  
5 a tape recorder and some control circuits, provides a  
6 very affordable and easy-to-use telephone apparatus. It  
7 answers the incoming phone call by taking a series of  
8 steps. It performs an off-hook operation to simulate the  
9 action of human-being picking up a handset Then, it  
10 starts the communication by making an announcement and  
11 takes the message from the caller by recording the  
12 message on an audio tape. when it finishes, it hangs up  
13 and sets the incoming message indicator, such as  
14 blinking a LED. The party being called can look at the  
15 indicator and knows immediately how many messages are on  
16 the machine. To retrieve the message, all it takes is to  
17 push one button. The regular tape recorder functions,  
18 such as STOP, PLAY, FAST FORWARD and REWIND, are  
19 available to the telephone answering system. The system  
20 has been so widely accepted that many manufacturers have  
21 integrated the answering/recording functions within a  
22 telephone apparatus. The voice mail system takes a step  
23 further. It creates individual voice-mail box for  
24 everyone on the list. It allows the sharing of one  
25 telephone answering system but still keeps the privacy  
26 of the individual.

27 While voice communication through the telephone  
28 becomes part of our daily lives, the widely used  
29 computer has created another format of communication-  
30 data communication, One of them is electronic mail, or  
31 E-mail. The electronic mail may contain text, image and  
32 digitized voice It provides a great alternative of  
33 communication among people. Through computer network  
34 system, one person can send a mail to another person  
35 anywhere in the world as long as the addressee has a  
36 computer connected to the same network The increasing  
37 popularity of the global computer network the Internet,  
38 has made the E-mail more useful than ever.

39 These two important ways of communication by the

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1   use of telephone and computer networks have worked very  
2   well in voice and data communication respectively. More  
3   sophisticate computer users are able to use computer  
4   with modem to conned with existing telephone networks to  
5   manage both data and voice communication, However, since  
6   the telephone lines can only be used on a 'dedicated'  
7   basis. Voice or data communication is totally blocked  
8   for a segment of time when that line is occupied in  
9   connecting by modem to computer networks or when two  
10   people are talking using' the phone. Because of the  
11   nature of operation, an electronic message, which has  
12   arrived at a server station, has to wait until a user  
13   logs on thus much useful time is wasted. This passive  
14   nature of E-mail delivery thus generates waste of useful  
15   resources and time when the messages are idle waiting to  
16   be retrieved.

17   There are some attempts to integrate a plurality of  
18   media communication in office environment Some  
19   representative examples are U.S. Pat No.5,333,266,  
20   entitled METHOD AND APPARATUS FOR MESSAGE HANDLING IN  
21   COMPUTER SYSTEMS, issued to Boaz et al. on Jul.26, 1994  
22   and U.S. Pat No. 5,349,636, entitled INTERFACE SYSTEM  
23   AND METHOD FOR INTERCONNECTING A VOICE MESSAGE SYSTEM  
24   AND AN INTERACTIVE VOICE RESPONSE SYSTEM, issued to  
25   Irribarren on Sept.20, 1994. Both rely on a powerful  
26   computer and a local area network to integrate multiple  
27   message systems. They were designed for office use not  
28   suitable for households or small offices. Another  
29   example is U.S. Pat 5,193,110, entitled INTEGRATED  
30   SERVICES PLATFORM FOR TELEPHONE COMMUNICATION SYSTEM. It  
31   is specifically designed for use in the central office  
32   of telephone company or in a large corporate office.  
33   These inventions do not provide a solution to the  
34   difficulties that higher skill level of computer are  
35   required for E-Mail communication, Regular daily use of  
36   E-Mail communication in homes, college dormitories and  
37   small offices are still not so convenient for most  
38   people.

39   Popular and routine use of E-Mail communications

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1 are still hindered by current requirements of equipment  
2 and network configurations. First, the E-mail is limited  
3 to those who have access to computers or terminal  
4 devices connected to a host computer capable of process  
5 E-mail. This may not be a problem in modem offices  
6 equipped with computers and networks for connecting to  
7 host computers or network servers. But it becomes a  
8 significant limiting factor for households and offices  
9 without the modem equipment or connecting networks.  
10 Secondly, the actual reception of the electronic  
11 messages can only be performed when the receiving  
12 computers, i.e., terminals for communication, are  
13 connected to E-mail server. The usefulness of E-mail is  
14 greatly limited in terms of timelines of the messages.  
15 In order to assure that no important messages are  
16 missed, a user has to log on to the network in a routine  
17 manner to 'check the mail' regularly. It may become  
18 burdensome during some inconvenient time. In order to  
19 resolve this difficulty, Clercq discloses in a U.S. Pat  
20 5,138,653, entitled SYSTEM FOR AUTOMATIC NOTIFICATION OF  
21 THE RECEIPT OF MESSAGES IN AN ELECTRONIC MAIL SYSTEM  
22 (issued on Aug. 11 1992), an E-mail system for making a  
23 call to an E-mail addressee which is triggered when a  
24 message is received. An addressee is then required to  
25 retrieve the E-mail from remote station by the use of a  
26 computer. It may even be more inconvenient than a  
27 beeper' as the addressee may not be in a convenient  
28 place with access to a computer and modem to log on to a  
29 server.

30 Therefore, a need still exists in the art of system  
31 design and device manufacture for electronic message  
32 communication to overcome these bottlenecks and  
33 inconveniences which limit the usefulness of the E-mail.  
34 Specifically, it is desirable to provide a telephonic E-  
35 mail apparatus which provides functions similar to a  
36 phone answering machine which is ready for a user for  
37 receiving, viewing or listening to the received  
38 electronic messages in a 'plug and play' fashion.  
39 Additionally, in order to minimize any inconvenience

1 thus caused to a user, it is desirable to adapt the  
2 telephonic E-mail apparatus without interfering existing  
3 telephonic communication operations. A user would thus  
4 be allowed to operate a telephone or phone answering  
5 machine with the E-mail apparatus as if no E-mail  
6 apparatus had been adapted into the system. An ordinary  
7 telephone user would then be provided with a convenient  
8 E-mail apparatus ready to be adapted into a telephone  
9 system without requiring the use of a computer and  
10 applying computer skills whereby the limitations and  
11 difficulties of the prior art can be resolved.

12 Moreover, as more and more people have access to  
13 computers providing for electronic mail messaging  
14 capabilities via the internet or internal networks,  
15 electronic mail messages, commonly referred to as e-mail  
16 messages, are becoming an integral part of modern  
17 communication. The delivery of an e-mail message occurs  
18 virtually instantaneously and the recipient of an e-mail  
19 message can reply to the message within minutes of the  
20 receipt.

21 However, for the situation where a user is  
22 connected via a phone line to the network, special  
23 problems exist. In this scenario, e-mail communication  
24 requires certain hardware and software combination in  
25 order for the user to send and receive e-mail messages.  
26 Generally speaking, for connection to the internet via a  
27 phone line to a network server, the necessary hardware  
28 includes a computer and a communication device such as a  
29 modem. Software wise, a mail program for the sending  
30 and receiving of e-mail messages is needed.

31 Additionally, there may be a monthly subscriber charge  
32 for connect time to the server imposed by a internet  
33 service provider if the user is not connected via a  
34 prepaid network. Overall, economically speaking, it can  
35 be a significant investment to have a computer set up  
36 for the sending and receiving of e-mail messages.

37 Moreover, the necessary hardware and software are fairly  
38 complex and may be difficult to set up by a novice user.  
39 These barriers bar majority of people from communicating

1 with e-mail messages.

Even if a user has a complete computer system setup for the sending and receiving of e-mail messages, there are problems with receiving the messages in a timely manner, with power consumption, and with security risks.

In order to receive e-mail messages in a timely manner, a user must either manually and periodically dial into a network server or program the computer to automatically and periodically dial into the server to check and retrieve new mail messages. The manual method is a time consuming and tedious process that distracts the user from productive use of his or her time. The automatic method requires that the computer be left on all of the time which wastes power and may incur telephone toll charges every time the computer calls the server. If the network server is programmed to call and deliver a new message to the user's computer upon receiving it, the user's computer must be left on all the time which again wastes power.

Moreover, whenever a computer is left on, there is a risk of security breach where there might be unauthorized access to the computer via either the phone line or from the keyboard by an unauthorized person and thereby compromising the user's computer system.

25 All in all, the above described factors prevents e-  
26 mail messages from being delivered to every household.  
27 Thus, a new e-mail system and a low cost device are  
28 needed to provide an universal e-mail messaging system  
29 capable of sending and receiving e-mail messages from  
30 and to every household.

## **SUMMARY OF THE PRESENT INVENTION**

33 It is therefore an object of the present invention  
34 to provide an apparatus and a new communication system  
35 architect and process ready for implementation on  
36 existing telephone system to overcome the aforementioned  
37 difficulties encountered in the prior art.

Specifically, it is an object of the present invention to provide an apparatus ready to adapt to an

1 existing telephone system in a 'plug-and-play' manner to  
2 receive and delivery electronic messages including text,  
3 images, and digitized voice signals whereby every  
4 household with a telephone can easily access to and be  
5 benefited by electronic messages without requiring more  
6 complicate processes of employing computer and modem and  
7 managing the execution of communication programs before  
8 such messages can be exchanged thereon.

9 Another object of the present invention is to  
10 provide a telephonic electronic message 'answering  
11 machine' which is equipped with user friendly features  
12 similar to a convention answering machine without  
13 interfering with existing telephone functions such that  
14 every regular house can apply such an apparatus  
15 immediately.

16 Another object of the present invention is to  
17 provide an electronic message apparatus which stores  
18 initial registration and subsequent logon information  
19 therein to automatically dial up several local servers  
20 directly, subject to user selection, to perform the  
21 initial registration and subsequent logon functions such  
22 that more complex functions of registration and logging  
23 on to a server can be managed automatically.

24 Another object of the present invention is to  
25 provide an electronic message apparatus which can  
26 coordinate with a server to perform message screening  
27 and message prioritizing functions such that a user can  
28 pre-arrange to receive or screen types of messages  
29 according to the importance of such messages.

30 Yet another object of the present invention is to  
31 provide a method and apparatus for facilitating,  
32 sending, and receiving of e-mail messages through  
33 interconnected computer networks or telephone networks.

34 A further object of the present invention is to  
35 provide a low cost method and apparatus for transmitting  
36 and receiving e-mail messages.

37 Yet another object of the present invention is to  
38 provide a low cost method and apparatus for delivering  
39 e-mail messages incurring minimum telephone toll

1       charges.

2           Briefly, in a preferred embodiment, the present  
3 invention includes a telephonic apparatus for processing  
4 electronic messages which includes a means for adapting  
5 to an existing telephone line for receiving electronic  
6 messages including digitized signals. The telephonic  
7 apparatus further includes a processing means for  
8 responding to the electronic messages and for storing  
9 the messages therein. In another preferred embodiment,  
10 the telephonic apparatus further includes an user  
11 interface means for providing information to an user  
12 relating to a reception of the electronic messages.

13          In another embodiment, a system for facilitating,  
14 sending and receiving e-mail messages is disclosed.  
15 This e-mail system is supported by one or more main  
16 servers and a plurality of regional servers  
17 geographically distributed in populated areas, and are  
18 interconnected via a computer network such as the  
19 internet. An incoming e-mail message under this system  
20 is first processed and packaged by the main server to  
21 allow tracking of this message. The packaged message is  
22 then sent to the designated local server via a regional  
23 server. The local server receives the e-mail message  
24 and notifies or delivers the message to a client (user)  
25 e-mail device through one of several available methods.  
26 These methods include direct mail delivery, call-back  
27 mail delivery, and notify-only. Under the notify-only  
28 method, the local server uses an optional ringing  
29 protocol to notify the e-mail device that there is a  
30 mail message waiting. Under the call-back delivery  
31 method, the local server uses the optional ringing  
32 protocol to notify the e-mail device, and the e-mail  
33 device then calls the local server to retrieve the  
34 message. Under the direct-delivery method, the local  
35 server calls the e-mail device and delivers the message.  
36 The e-mail device is a novel device designed to send and  
37 receive e-mail messages. It is a low cost device that  
38 may be a stand-alone device, a part of a multi-function  
39 device, or a part of a computer expansion card. The

1 servers of the present invention can be maintained and  
2 operated remotely.

3 An advantage of the present invention is that it  
4 provides a method and apparatus for facilitating,  
5 sending, and receiving e-mail messages through  
6 interconnected computer networks and/or telephone  
7 networks.

8 Another advantage of the present invention is that  
9 it provides a low cost method and apparatus for  
10 transmitting and receiving e-mail messages.

11 Yet another advantage of the present invention is  
12 that it provides a low cost method and apparatus for  
13 delivering e-mail messages while minimizing telephone  
14 toll charges.

15 These and other objects and advantages of the  
16 present invention will no doubt become obvious to those  
17 of ordinary skill in the art after having read the  
18 following detailed description of the preferred  
19 embodiments.

20

21 **BRIEF DESCRIPTION OF THE DRAWINGS**

22 Fig. 1 is a diagram showing how the present  
23 invention of the E-mail apparatus connects with the  
24 existing telephone answering system.

25 Fig. 2 is a block diagram of the present invention  
26 of E-mail capable telephone apparatus.

27 Figs. 2a, 2b, 2c, 2d are preferred embodiments of  
28 communication systems which incorporate an E-mail  
29 apparatus of the present invention.

30 Fig. 4 is an implementation example of a basic  
31 front control panel of the apparatus.

32 Fig. 5 is an example of more complicated or non-  
33 frequently used functions menu of the apparatus.

34 Fig. 6 is a flow diagram of the easy registration  
35 process.

36 25

37 Fig. 7 is a flow diagram of a typical E-mail  
38 collecting process.

39 Fig. 8 is a flow diagram of an E-mail receiving

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1 process.

2 Fig. 9 is a flow diagram of the E-mail delivery  
3 process on the E-mail sever.

4 Fig. 10 is the overall network connection diagram.  
5 It shows how the E-mail ready telephone communicates  
6 with the server and the rest of the world.

7 Fig. 11 illustrates a conceptual representation of  
8 the internet, a number of servers connected to the  
9 internet, and a number of computers connected to each  
10 server;

11 Fig. 12 illustrates a conceptual representation of  
12 the e-mail system of the present invention utilizing the  
13 internet, servers, and e-mail devices;

14 Fig. 13 shows a hierachial relationship between  
15 the main server, regional servers, and local servers;

16 Fig. 14 shows another hierachial relationship  
17 between the main server, regional servers, and local  
18 servers where the local servers may be connected  
19 directly to the main server;

20 Fig. 15 illustrates the steps for registering an e-  
21 mail device;

22 Figs. 16a-16d show the pseudo code for the  
23 procedures residing on the main server for facilitating  
24 incoming and outgoing e-mail messages;

25 Figs 17a-17h show the pseudo code for the  
26 procedures residing on the local server for interacting  
27 with the main server and the e-mail device;

28 Fig. 18a shows a computer expansion card  
29 implementation of the e-mail device;

30 Fig. 18b-18c illustrate the pseudo-code for the  
31 software residing on the computer system for operating  
32 the e-mail expansion card;

33 Fig. 19a-19d show other computer expansion card  
34 implementations of the e-mail device used in conjunction  
35 with a fax/modem;

36 Fig. 20 illustrates a block diagram of the  
37 components in implementing the ringing protocol on the  
38 local server side;

39 Fig. 21 illustrates a block diagram of the

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1 components in implementing the ringing protocol on the  
2 e-mail device side; and

3 Fig. 22 illustrates a block diagram of an  
4 integration of a faxing device and the e-mail device.

5 Fig. 23 illustrates a configuration for remote-  
6 controlling a server computer using the ringing protocol  
7 of the present invention.

8

9 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

10 Referring to Fig. 1, the block diagram shows how  
11 the present invention of the E-mail apparatus connects  
12 to the telephone and the answering system. A twisted-  
13 pair of telephone line 5a connects the phone jack 4 on  
14 the wall to the "line" connector on the E-mail apparatus  
15 1. Another telephone wire 6 connects the "phone"  
16 connector on apparatus 1 to the answering system 2. Then  
17 the answering system 2 connects to the telephone  
18 (handset and keypad) through line 5c. if there is no  
19 answering machine, line 5b connects to the telephone  
20 directly. Every incoming phone call will be taken by the  
21 E-mail apparatus first. If it is not for E-mail, it will  
22 pass the call to the answering system. It is important  
23 to maintain the same functionality of the existing  
24 telephone answering system when the apparatus is added  
25 to the telephone/answering system. It will be clear when  
26 we explain the inside of the apparatus 1. In Fig 1. it  
27 shows that the apparatus has 4 major building blocks:  
28 central control & telephone line interface unit 6, front  
29 panel display and control 7, optional display unit 8,  
30 I/O interface and other devices 9. Only the central  
31 control & telephone line interface unit 6 is needed for  
32 every apparatus. The others may have many different  
33 combinations.

34 Fig. 2 is the internal detailed diagram of the E-  
35 mail apparatus. Processor 11 reads the codes stored in  
36 ROM 12 and performs its duty according to the request  
37 from the user. For example, if the auto-collect is set  
38 up, processor 11 will receive an interrupt signal from  
39 interrupt controller 17. The interrupt will be serviced

-12-

1 by processor 11 to set up modem 23 through universal I/O  
2 bus 20 and dial the designated E-mail server to collect  
3 the E-mail. By using an universal I/O bus 20, it makes  
4 the architecture flexible to add or reduce its  
5 functions. Block 14 contains logic to interface system  
6 bus and I/O bus. Blocks 11-20 constitute the basic  
7 central control unit Blocks 21-23 belong to the  
8 telephone interface unit The basic control and display  
9 unit has blocks 25 and 26. Block 28 is the display for  
10 mail reading and block 27 is the controller for block  
11 28. There are two displays in Fig. 2 The small display  
12 in 26 is used for control and status information. To  
13 display mail, a bigger display 28 is more suitable. If  
14 display 28 is built-in, display 26 can be eliminated. If  
15 the user relies on data export function to move E-mail  
16 files to his computer and to read the mail there,  
17 display 26 alone will be enough. Display 28 can be a  
18 LCD, monitor or a TV, and display control 27 will be a  
19 compatible controller. RAM 12 is a device used as a  
20 scratch pad for processor during the execution of the  
21 codes from ROM 12 ROM 12 can be a flash memory.  
22 Processor 11, ROM 12, RAM 13 and I/O bus controller 14  
23 are connected to system bus 15. I/O bus controller  
24 allows the processor to communicate with all the other  
25 I/O devices. Real time dock 19 keeps track of the time.  
26 Timer 18 and interrupt controller 17 are used for  
27 program flow control. Clock and power management 16 is  
28 used to save the power consumption of the apparatus.  
29 when power consumption is not a concern, block 16 can be  
30 as simple as a dock chip. Processor 11 responds to the  
31 user request from front panel control 26 through panel  
32 interface block 25. It also uses panel interface block  
33 25 to display other information to user. UART 22 is a  
34 serial communication block, it is used to move data  
35 between the E-mail apparatus and the external world.  
36 Through the modem and telephone line, it connects the  
37 apparatus to other communication devices. With a local  
38 Rs-232 or infra-red link, it can import/export data  
39 to/from a computer, digital organizer or printer.

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1      Display control 27 is to display the mail on a display  
2      device 28. Some desirable devices such as secondary  
3      storage device 21, audio device 29 are optional add-ons.  
4      If a reasonable size of flash device is used as storage,  
5      block 21 will not be important Telephone interface block  
6      24 controls the interface with telephone line, telephone  
7      answering system and modem. The details of block 14 are  
8      shown in the diagram of Fig 3.

9           There are many electronics devices available to  
10     implement Fig 2. Here is one example. Use the single  
11     chip platform VG-230 from Vadem (San Jose, California)  
12     for blocks 11, 15, 16-19, 20, 22, 27 in Fig. 2. This  
13     chip has processor, memory controller, I/O bus and many  
14     I/O peripheral devices integrated into a single chip.  
15     Modem (block 23) can be the single-chip modem SSI  
16     73K321L from Silicon Systems (Tustin, California).

17        Figs. 2a - 2d are preferred embodiments showing  
18        some of the possible combinations of the modules. Fig.  
19        2a uses TV as a primary display of mail. Block 28 in  
20        Fig. 2 is replaced with a television 28a. Flash memory  
21        12a is used for codes and mail storage space. This is  
22        one of the simple implementations. Fig. 2b is suitable  
23        for people who have access to the computer. It is  
24        comprised of a floppy controller and drive. The mail is  
25        save on a floppy diskette. The user can take diskette to  
26        a computer and read mail there. Block 25 can be  
27        simplified since there is no need to control the display  
28        of mail. This is an example of how to count on data  
29        export function to reduce the configuration of the  
30        apparatus. Fig. 2c is another example of data export  
31        function except using different means of moving data is  
32        used. It uses Infra-red link o move data to/from the  
33        computer. In both cases, outgoing mail can also be  
34        imported from diskette or infra-red-link. Fig. 2d is an  
35        example with extensive functions. It contains removable  
36        flash memory card 26b using industry standard PCMCIA  
37        interface to save mail. It has a built-in LCD display  
38        28b for reading mail. An audio device 29a will generate  
39        voice if the incoming mail contains a digitized voice

1 file.

2 Fig. 3 is the diagram showing internal block of the  
3 telephone interface function. When the system is in idle  
4 state (i.e. no incoming phone call), line switch 31 is  
5 set to telephone line 35 and interface control 34 and  
6 line 39 is open. When there is an incoming phone call,  
7 the telephone line interface control 34 will generate an  
8 off-hook to the caller and then monitor line 35 to see  
9 if it is an E-mail communication from line 38. If it is  
10 not, interface control 34 triggers a ring through the  
11 ring control 32 and lines 40, 41 and 42 to the telephone  
12 answering system. When handset/keypad interface block 33  
13 detects off-hook signals on line 37 from the telephone  
14 answering system, line switch 31 turns the switch to  
15 line 39. Then the telephone is in control. The E-mail  
16 apparatus gives up communication to the  
17 telephone/answering system. This is a very important  
18 process for maintaining the function of telephone  
19 answering system function as if the E-mail apparatus is  
20 absent. In the case of E-mail communication, line switch  
21 31 keeps the phone line connected to 35 all the time.  
22 Handset and keypad interface block 33 also becomes  
23 active when the keypad is used to control the E-mail  
24 apparatus or to edit an outgoing mail. The keypad  
25 information will be passed to the processor to respond.

26 Fig. 4 is an example to show the concept of the  
27 easy-to-use interface. Block 51 is a simple display  
28 panel. Blocks 52-57 are control buttons. Button 58 is a  
29 control button and an indicator. A blinking indicator 58  
30 means an incoming mail is ready for retrieval. The user  
31 can push button 54 to read the mail. At every push of  
32 button 54, a full page of mail would be displayed to fit  
33 into the size of the display. Push button 55 to jump to  
34 the next mail. Button 53 is to display the previous  
35 page. Pushing button 52 to jump to the beginning of the  
36 previous mail. Pushing button 52 longer means back  
37 to the beginning of the first mail and the mail will be  
38 overwritten when the next batch of mail arrives. Pushing  
39 button 58 will dial, send and collect mail. When it is

1 done, a message will be displayed on block 1 and call  
2 indicator 8 will be blinking. Button 56 is used to  
3 interrupt the E-mail communication when the user needs  
4 to use the telephone. Button 57 is a special function  
5 button. It provides more complicated or unusual  
6 functions. It brings a menu of functions for the user to  
7 select. The functions may include registration, mail  
8 forward, and mail hold request. The list in Fig. 5 is an  
9 example for those functions. The concept of separating  
10 all the basic and frequently-used functions from the  
11 complicated and infrequently-used functions by different  
12 interfaces makes the E-mail apparatus a user-friendly  
13 device while maintaining some advanced functions.

14 Fig. 5 exemplifies a list of the menu of more  
15 complicated and infrequently-used functions. Function 1  
16 is a guided registration process function. Function 2 is  
17 to set the current time. Function 3 is to set the  
18 programmable secret code. Function 4 is to change the  
19 number to dial other than the designated E-mail server.  
20 Function 5 is to request E-mail server to hold the mail.  
21 Function 6 is to request the forwarding of the mail.  
22 Function 7 is to set up the daily auto-dial and connect  
23 time with the E-mail server. Function 8 is for data  
24 import/export. Function 9 is to display your e-mail  
25 address. Function 10 is to request the change of E-mail  
26 address if you don't like the assigned address after  
27 registration. Function 11 is to run diagnostics on the  
28 unit. By pushing button 57 in Fig. 5, the menu of  
29 functions will be on the display 51 in Fig. 4. Every  
30 push will display next function. Button 58 is used to  
31 select the function. When the function is selected, the  
32 software in apparatus will guide user through the  
33 process. If the unit has a bigger LCD display built-in,  
34 it may display all the function at once, and the user  
35 can move the cursor around the menu to select the  
36 function.

37 Whenever the apparatus does not detect any action  
38 from the user for an extended period of time, such as 10  
39 minutes, it aborts all the incomplete process and resets

1 to the idle state.

2 Therefore, the present invention discloses a  
3 telephonic apparatus for processing electronic messages  
4 which includes a means for adapting to an existing  
5 telephone line for receiving electronic messages. The  
6 telephonic apparatus further includes a processing means  
7 for responding to the electronic messages and for  
8 storing the messages therein. In another preferred  
9 embodiment, the telephonic apparatus further includes an  
10 user interface means for providing information to an  
11 user relating to a reception of the electronic messages.

12 Fig. 6 is the flow chart of a typical registration  
13 process. The user only needs to push a few buttons (step  
14 101 in the diagram) and enter the phone number (step  
15 103). The process will automatically take place by doing  
16 steps 104-111 and an E-mail address will be assigned and  
17 displayed (step 108). Step 111 is to search the phone  
18 number of the best E-mail server for the user to dial in  
19 based on user's phone number and save the number in the  
20 apparatus.

21 There are two ways to communicate between an E-mail  
22 apparatus and its server. One way is auto-connect, the  
23 other is the conventional logon process. When the E-mail  
24 apparatus initiates a call to the server, the server  
25 will try to auto-connect first. It is an automatic  
26 process and requires no user attendance. The first  
27 requirement for the auto-connect is that the server  
28 knows the user's E-mail address and the machine ID of  
29 the E-mail apparatus. The second requirement is that the  
30 server and the E-mail apparatus have the same derived  
31 password. The derived password is a code generated by an  
32 equation based on the P code (programmable code), the  
33 user's phone number and the machine ID. In order to do  
34 transaction, both need to share the same equation.  
35 Checking the machine ID and the derived password, the  
36 server can determine the legitimacy of the request from  
37 the E-mail apparatus. The auto-connect provides the  
38 convenience of automatic downloading mail. But if the  
39 checking fails, the server will ask the user to enter

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1       the password. This is the case when a different machine  
2       is used to download mail, the E-mail apparatus has a  
3       different machine ID. The server will not use auto-  
4       connect, and a conventional logon process is required to  
5       access for security reasons.

6       In the case of a server initiating the call to an  
7       E-mail apparatus, the auto-connect is the only way to  
8       communicate and get/give access. In other words, only  
9       the designated server can deliver mail to the designated  
10      E-mail apparatus. This is to provide security and  
11      convenience. if the user gets a new E-mail apparatus, a  
12      change of registration is required to get the auto-  
13      connect function.

14      The following is a detailed process of the access  
15      legitimacy checking in the auto-connect mode. First, the  
16      apparatus sends its unique serial number (i.e. machine  
17      ID) to the E-mail sever. Secondly, the apparatus sends  
18      its E-mail address to the server. if these two do not  
19      match, the server will ask the user to enter the  
20      password and the conventional logon process takes place.  
21      Otherwise, the E-mail apparatus will proceed to send its  
22      programmable code or P code and the derived password to  
23      the server. The derived password is generated from the  
24      machine ID, P code and user's phone number. It is sent  
25      to the server and compared against the derived password  
26      from the server. If the server checks and finds it  
27      correct the access is authorized. The programmable code  
28      or P code to the E-mail sever is used as an instruction  
29      to screen the incoming mail and to generate a derived  
30      password.

31

32      Fig 7. is the flow diagram to show how the  
33      apparatus connects to the E-mail server, sends the  
34      outgoing mail and receives the incoming mail. It can be  
35      performed on a predetermined time daily (which starts  
36      from step 122 in the diagram) or upon the request from  
37      the user (which starts from step 121 in the diagram).  
38      Steps 127, 129 and 130 are where security and screening  
39      processes take place. Steps 134-138 are designed to

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1 prevent the overflow of incoming mail and protect the  
2 integrity of the received mail. The details are  
3 explained later.

4 Fig 8. is the flow diagram of how an E-mail  
5 apparatus responds to a request from the server.  
6 whenever there is an incoming call, the apparatus will  
7 do "off-hook" (step 142) and check if it is an E-mail  
8 request (step 143). if it is not, the call will be  
9 directed to regular voice communication as steps 144-  
10 146. Otherwise, it proceeds to step 147. If the machine  
11 ID and derived password checking passes, the transaction  
12 starts. if it fails, the call is terminated. Step 148 is  
13 an option. It will inform the addressee of a potential  
14 problem on the mail delivery. The mail transfer  
15 transaction can process the outgoing mail (step 149) and  
16 check if the total mail size fits into the E-mail  
17 apparatus. if not, only parts (extracted) of the mail  
18 are delivered (step 153). Before terminating the  
19 process, the incoming mail indicator is updated (step  
20 155).

21 The following is the detailed description on how  
22 the E-mail server screens the incoming mail. It includes  
23 sorting, extracting and repackaging before the delivery  
24 of the mail.

25 The present invention uses the extension of the E-  
26 mail address and the programmable codes or P code  
27 received from the apparatus to determine the importance  
28 of the incoming mail. The E-mail address is based on the  
29 naming convention on the Internet, called Domain Name  
30 System (DNS), with additional field. The DNS has the  
31 general format as:

32 <someone>@[subdomain].[subdomain]....<domain>  
33 where the <...> represents required elements and [...] is  
34 optional portion. A typical example looks like:  
35 jsmith@sales.abc.com for John Smith in the sales  
36 department of ABC corporation "jsmith" is the account  
37 name for John Smith. It is assigned to him by the system  
38 administrator of the host computer. Usually, it is the  
39 logon name used to access the host computer. And abc.com

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1   is the name of the host computer connected to the  
2   Internet network There is governing body for the host  
3   name assignment The name will be translated into 'P  
4   address and recognized by the peer on the network Hence  
5   a mail from bigbird@xyz.com can be delivered to abc.com  
6   host computer through the global network, internet. When  
7   the host computer named abc.com receives the mail, it  
8   knows its subdomain, sales. It sends the mail to the  
9   internal E-mail server in sales department of ABC  
10   corporation. When John Smith logons the computer, he  
11   will be notified of the arrival of the E-mail.

12   The present invention uses some extensions on top  
13   of the DNS to provide some enhancements. The new  
14   extended E-mail address for jsmith@sales.abc.com become  
15   jsmith[.<specialcodes>]@sales.abc.com. The general  
16   format becomes:

17   <<someone>.[specialcodes][ClassofMail]@[subdomain].[...].<dom ain>  
18       One example looks like:jsmith.4567ER@sales.abc.com.  
19       Here "4567" is used to compare with the P code on the  
20       apparatus. The result of the comparison determines the  
21       importance of the incoming mail. An incoming mail with  
22       special codes completely matching the P code will get  
23       the highest priority. A mail with partially matched  
24       codes will gain some attention based on how close the  
25       address extension codes compare with the security code.  
26       In the above examples, "E" indicates the mail is Express  
27       mail, so it will be delivered in a more timely fashion.  
28       The "R" indicates the mail is registered. It requires a  
29       return receipt when the mail is delivered successfully.  
30       A mail without the special codes on the E-mail address  
31       will be treated by the E-mail server as a regular bulk  
32       mail.

33       Since the E-mail ready telephone apparatus is  
34       likely to be a small special-purpose device, the  
35       relatively limited capacity requires more careful  
36       management The P code provides a very simple way to sort  
37       the incoming mail and prevent the flooding of the junk  
38       mail. But, even with the screening feature, the  
39       unexpected volume of incoming mail may still cause mail

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1      box overflow. The mail repackaging function on the  
2      server will prevent this from happening. It works as  
3      follows.

4           After the legitimacy checking, the E-mail server  
5      gets the information of available storage on the E-mail  
6      apparatus and decides what to send. If the total size of  
7      the incoming mail exceeds the available storage space on  
8      the apparatus, the E-mail server extracts the incoming  
9      mail and "repackages" the E-mail and sends it to the  
10     apparatus. The extracting process may reduce the mail  
11     size by taking the whole content of high priority mail  
12     but only the subject, name of sender from the lower  
13     priority mail. It may use a complicated method to  
14     achieve the best result from extracted mail. The  
15     protocol puts the intelligence and complexity to the E-  
16     mail server but keeps the E-mail apparatus simple. It is  
17     an important concept in the present invention.

18       Fig 9. is the flow diagram of how an E-mail server  
19      processes the mail. Step 166 actually is a two-step  
20     process as explained before in Fig. 7. Step 170 sending  
21     the outgoing mail and steps 171-172 checking and sorting  
22     incoming mail can be done in parallel. Different class  
23     of mail may take different steps as shown in step 163  
24     (for express mail) and step 176 (registered mail). This  
25     flow diagram exemplifies how a mail is processed.

26       Fig. 10 exemplifies the overall network connection.  
27      The E-mail ready telephone 200 connects to its local E-  
28      mail server 202 through the existing telephone network  
29      201. Usually, the local E-mail server 202 connects to  
30      the host computer 204 with a LAN (local area network)  
31      203. A global network 205 links the host computer 204  
32      and 206 together. The network 205 usually is a WAN  
33      (wide-area network). Computers 208,209,210 and the host  
34      computer 206 are connected by a LAN 207. A user can send  
35      an E-mail from computer 208 to an addressee of the E--  
36      mail ready telephone system 200. The E-mail will travel  
37      to the host computer 206 through the LAN 207. The host  
38      computer 206 serves as a gateway to the global network  
39      205. The mail will be passed to the WAN 205. It may

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1 travel through several host computers before reaching  
2 the host computer 204 which has the correct domain name  
3 of the E-mail address. Then the host computer 204 will  
4 look at the E-mail address or the sub-domain name and  
5 send the mail to Local server 202 through Local server  
6 203. The mail will stay in the server and the process of  
7 Fig. 9 takes place. The server will deliver the mail  
8 either by dialing the addressee's phone number or by  
9 just waiting for the request from E-mail ready  
10 telephone. Those are the process flows in Figs. 7 and 8.  
11 All the communication process, including legitimacy  
12 checking, mail size checking and mail transfer, taken  
13 place between the server and the E-mail ready apparatus  
14 are through the telephone network 201. When the E-mail  
15 apparatus initiates the connection, as described in the  
16 process flow of Fig. 7, the server will check if it is  
17 the right machine before giving the mail. If the machine  
18 ID checking fails, the user has to enter the password to  
19 gain access. If the server initiates the call to the E-  
20 mail apparatus and finds the incorrect machine ID, mail  
21 won't be delivered. But the E-mail apparatus will  
22 signifies the addressee of the failed attempt In any  
23 case, the server has to request the information of the  
24 available storage space on the E-mail apparatus before  
25 sending the mail. It may be necessary for the server to  
26 determine the priority of the mail based on the p code  
27 and extract partial information for delivery. In other  
28 words, it is server's responsibility to deliver the  
29 proper size of mail to the apparatus.

30

31 **DETAILED DESCRIPTION OF A SECOND EMBODIMENT**

32 Referring to Fig. 11, the network infrastructure  
33 (for a network such as the internet) 1014 is comprised  
34 of a number of interconnected servers 1012 communicating  
35 with each other using a common protocol (such as  
36 TCP/IP). A user may communicate to another user by  
37 using a computer 1010 that is connected to a server that  
38 has a point of presence on the network. The user may  
39 then send a mail message to another user having an

1 address at a computer connected to another server.  
2 Under this paradigm, computers are needed at both ends  
3 of the communication link and the costs for the  
4 computers may be quite high. Additionally, local area  
5 network (LAN) is used extensively in the corporate  
6 environment to connect the user's computer to the mail  
7 server. The LAN allow the user's computer to  
8 communicate to mail server in real time which acts like  
9 a local post office in the e-mail world. Real time  
10 communication between the user computer and the server  
11 allows e-mail messages be sent and received in a timely  
12 manner. However, LAN or any existing real time network  
13 is expensive and difficult to install for small  
14 businesses and households. In these situations, a phone  
15 line (voice or ISDN) is used for most people to  
16 communicate with the mail server from their home  
17 computers. This approach reduces the cost at the price  
18 of real time connection. Without real time  
19 communication, the communication efficiency and  
20 convenience is greatly reduced.

21 Referring to Fig. 12, an e-mail messaging system of  
22 the present invention utilizing the existing internet  
23 infrastructure is presented. The user can use a low  
24 cost e-mail messaging device 1018 to communicate with a  
25 mail server 1016 or another e-mail messaging device  
26 1018. The device in accordance with one embodiment of  
27 the present invention is simply a low cost stand alone  
28 device capable of receiving a notification that one or  
29 more e-mail messages have been received at the local  
30 server 1016 waiting for retrieval. The device also is  
31 capable of identifying an incoming signal as an e-mail  
32 message signal, receives the incoming e-mail messages  
33 and stores them. Moreover, the device can provide the  
34 needed functional components for the user to compose an  
35 e-mail message and deliver the e-mail message to the  
36 local server or another e-mail device directly. The e-  
37 mail device uses minimum set of electronic components  
38 and consumes very low power when compared to the power  
39 consumption of a computer. It can be left on like an

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1        answer machine. There are also other possible  
2        embodiments of the e-mail device.

3              Fig. 13 illustrates the preferred hierarchy for the  
4        e-mail messaging system. At the top level, there is a  
5        main server 1020 receiving e-mail messages from the  
6        internet network and sending e-mail messages originated  
7        from the client e-mail devices to the network. The main  
8        server may be one or more computers sharing a  
9        centralized database. The main server 1020 distributes  
10      and receives e-mail messages from a number of regional  
11      servers 1022. Each regional server 1022 is designated  
12      to serve a particular geographical area and serves one  
13      or more local servers 1024. The local servers 1024  
14      interact with the client e-mail devices 1026 within its  
15      geographical area. The client device is designated to  
16      be a simple, low-cost electronic device suitable for  
17      home or business use, and it is further described infra.

18             To illustrate the message flow, the main server  
19      1020 receives an e-mail message, identifies the e-mail  
20      address, determines the regional server 1022 for this e-  
21      mail message, and sends it to the corresponding regional  
22      server 1022. The regional server may be designated to  
23      serve a city or a greater metropolitan area involving  
24      several area codes. After it receives a message, it  
25      forwards the message to the local server. A local  
26      server is designated for each sub-region and directly  
27      serves the clients and their e-mail devices.

28             Implementation wise, a regional server and a local  
29      server may be logically separate systems residing on the  
30      same physical machine. Each local server is equipped  
31      with the necessary hardware and software to communicate  
32      with clients' e-mail devices.

33             In an alternate embodiment, referring to Fig. 14,  
34      the main server 1020 may communicate directly with local  
35      servers to send and receive e-mail messages to and from  
36      the client e-mail devices.

37             Although the illustrated embodiments show a  
38      hierachial structure, it is within the scope of the  
39      present invention to implement the present invention in

1       a distributive structure.

2           In order to provide direct e-mail messages to each  
3       client, each client is identified by an unique e-mail  
4       address, and must be registered with the e-mail system  
5       in order for the e-mail system to interact with the e-  
6       mail device. Typically, the e-mail device is accessed  
7       via a local telephone line such as a voice, data or ISDN  
8       line.

9           Fig. 15 illustrates the steps for the registration  
10      process where an e-mail device (as operated by the  
11       client) dials a toll-free number, logs on the main  
12       server, and the main server performs the illustrated  
13       steps. First, the main server requests and obtains the  
14       machine identification number unique to the particular  
15       e-mail device. The machine identification number  
16       identifies the device type and also provides for theft  
17       prevention. Secondly, the main server gets the security  
18       code (password) entered by the user. The use of a  
19       security code minimizes the possibility that the mail  
20       messages being delivered or received by the wrong party.  
21       Next, the main server fetches the notification code from  
22       the e-mail device. The notification code is an optional  
23       ringing protocol used by the main server to provide a  
24       notice to the e-mail device through the use of ring  
25       tones without incurring telephone toll charges.

26           The phone number for connecting to the e-mail  
27       device is provided to the main server. For the given  
28       phone number, the main server finds the corresponding  
29       local server and its phone number, and sends this phone  
30       number to the e-mail device. The e-mail device stores  
31       it in its memory for future use. Finally, the main  
32       server completes the registration process by completing  
33       and inserting a new client information entry into the  
34       centralized database.

35

### 36       Main Server

37           To track information on the clients, the local  
38       servers, and the regional servers, two tables are  
39       maintained by the main server. In table one, each

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1 client's name, phone number, e-mail address, the local  
 2 server for the client, and other administrative or  
 3 accounting information are kept.

4

TABLE 1

5 Client Name	E-Mail Addr	Local Server	Phone Number	Other Info.
6 John Smith	jsmith	1	(210) 231-1234	
7 Bob Clinton	bclinton	1	(210) 231-7890	
8 Al Goodman	agoodman	2	(123) 789-1234	
9 Mike White	mwhite	2	(123) 789-4321	

10

11 Table two contains information for each local  
 12 server, information such as the address of the regional  
 13 server for the local server and the type of connection  
 14 from the main server to the regional server.

15

TABLE 2

16 Local Server	Regional Server Address (e-mail)	Connection Type
17 1	system@region1.com	Internet
18 2	postmaster@region2.com	(210) 111-1234 (leased line)

19

20 For example, there are two local servers illustrated in  
 21 table two. The regional server for local server one is  
 22 connected to the main server via the internet, and the  
 23 regional server for local server two is connected to the  
 24 main server via a leased line for high speed  
 25 communication. Other types of connection methods  
 26 between the regional servers and the main server can be  
 27 utilized as well (e.g. satellite) if they are  
 28 economically feasible. Additional tables can be created  
 29 and maintained as needed.

30 For the purpose of organizing incoming e-mail  
 31 messages, a mailbox is dedicated to each client and  
 32 maintained by the main server. The mailbox can be a  
 33 file or any other type of indexable storage system.

34

Referring to Fig. 16a, the main server is

1       instructed to check for and process incoming and  
2       outgoing mail messages every x minutes where x is a  
3       defined period of time which can be a function of the  
4       load on the system.

5           Referring to Fig. 16b, the steps for processing  
6       outgoing mail messages are illustrated. Outgoing mail  
7       messages come from clients of the e-mail system for  
8       delivery to other users on the net. This process is  
9       performed every so often to ensure mail is processed in  
10      a timely manner. If there is a new mailbag from a local  
11      server, the new mailbag is decompressed, and the mail  
12      messages are extracted from the mailbag and passed to  
13      the send mail utility. The send mail utility can be a  
14      common mail program (e.g. Unix Operating System sendmail  
15      utilities) with the capability of sending and receiving  
16      e-mail messages.

17       Fig. 16c illustrates the steps for processing  
18      incoming mail messages where a mailbag is prepared for  
19      each local server. The local servers are indexed  
20      consecutively starting with index equals one 1030. For  
21      each local server, a new mailbag is initialized 1032.  
22      For each client serviced by the particular local server,  
23      the client's mailbox is searched, and new messages are  
24      extracted and appended to the mailbag for the particular  
25      local server 1034. The new mail messages are then  
26      deleted from the mailbox for the client 1034.

27       If the mailbag is not empty, the mailbag is  
28      compressed, and a confirm flag is set 1038. If the size  
29      of the mailbag after compression is greater than the  
30      maximum size allowed for mail delivery, the mailbag is  
31      split into two or more smaller mailbags. A copy of the  
32      mailbag(s) is then stored in a To-Be-Confirmed directory  
33      for later confirmation, and the mailbag(s) is sent to  
34      the regional server for the particular local server.

35       After all of the mailboxes for a particular local  
36      server have been processed, the process repeats until  
37      all of the local servers' mailbags have been processed.

38       The main server also performs a confirmation  
39      process to ensure that the mailbags and the individual

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1 mail messages have been received. Referring to Fig.  
2 16d, the steps for the confirmation process is  
3 illustrated. Every so many minutes, the confirmation  
4 process is executed. For each confirm flag that is set  
5 (confirm [i]=true), the main server searches for a  
6 confirmation message from the corresponding local  
7 server. If a confirmation message is found and not all  
8 the mail messages have been delivered and the elapsed  
9 time is greater than the maximum allowed elapsed time,  
10 the undelivered mail message is placed in an undelivered  
11 mail directory and the operator is notified. If the  
12 confirmation message is not found and the elapsed time  
13 has exceeded a maximum allowed elapse time, the operator  
14 is notified. If all the mail messages are confirmed as  
15 successfully delivered, the mail bag is placed into  
16 archive.

17

18 **Regional Server**

19 The function of the regional server is to serve as  
20 an intermediary between the main server and the local  
21 servers. The regional server is configured to have the  
22 function of an ISP Point-of-Presence (like an internet  
23 service provider) in order to receive and send mail via  
24 the internet. It maintains a shell account and a  
25 mailbox for each of the local server it serves. The  
26 regional server interacts with its local servers to  
27 facilitate the handling of incoming and outgoing  
28 mailbags. The mail utilities commonly available with  
29 the operating system (e.g. Unix) of the regional server  
30 can be utilized to achieve the tasks described.

31 The regional server can be configured to operate as  
32 a local server as well.

33

34 **Local Server**

35 Each local server maintains a table of clients.  
36 For each client, referring to Table 3, the client's  
37 name, e-mail address, phone number, notification type,  
38 ringing protocol, security code, machine ID, and other  
39 miscellaneous information are kept.

1

TABLE 3

2

Name	E-Mail Address	Phone Number	Notification Type	Ringing Code	Security Code	Machine ID
John Smith	jsmith	(210) 231-1234	notify-only	0.5/ 0.25	123	789
Bob Clinton	bclinton	(210) 231-7890	call-back	0.3/ 0.5	456	111

3

4

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6

There are three notification/delivery types: notify-only, call-back mail delivery, and direct mail delivery. In the notify-only notification method, the local server calls the client's e-mail device using the specified ringing protocol from the table. No connection is actually made between the local server and the e-mail device. The rings are set up in such a manner that the e-mail device is programmed to recognize the ring pattern and determine that a notification is being delivered by the local server. When the notification is successfully received, the e-mail device activates an indicator light on the e-mail device. The client/user can then retrieve the message at his or her convenience using the e-mail device or other means. If in the process of notifying the e-mail device, an actual connection is made, the e-mail device can be set to call the local server to retrieve the e-mail messages or messages can be directly delivered.

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In the call-back mail delivery method, similar to the notify-only method, the ringing protocol is used to notify the client's e-mail device that there is one or more e-mail messages waiting at the local server. The notification causes the e-mail device to call the local server and retrieve the e-mail messages.

In the direct mail delivery method, the local server calls the e-mail device, connects with the e-mail device, and delivers the e-mail messages to the e-mail device. The client may designate any one of the three notification methods as long as it is supported by the

1 e-mail device and the local server.

2       The optional ringing protocol is a method for the  
3 local server to provide notice to the e-mail device  
4 without incurring toll charges. It utilizes and  
5 controls the length of ring time and the length of time  
6 between rings. Using this method, a calling device  
7 (here the local server) dials the number, detects ring  
8 tone for  $x_1$  second(s), hangs up, waits for  $w_1$  second(s),  
9 dials the number again, detects ring tone for  $x_2$   
10 second(s), and hangs up. The receiving device (here the  
11 e-mail device) upon detecting this particular ringing  
12 protocol determines that a notice is being delivered by  
13 a calling device, and accordingly executes a  
14 preprogrammed routine (if any). The ringing procedure  
15 of dial, detect, hang up, and wait is not limited by a  
16 specific number of iterations and may be repeated a  
17 number of times. In the preferred embodiment, this  
18 procedure is repeated three times, using  $x_1$ ,  $x_2$ ,  $x_3$  and  
19  $w_1$ ,  $w_2$ . The method may be simplified by setting  $w_1$  and  
20  $w_2$  to have the same length of time. Other combinations  
21 are possible as well as long as the e-mail device is  
22 configured to detect and recognize the designated  
23 ringing protocol. In the preferred embodiment of the  
24 present invention, a ringing code,  $n/m$ , is used for each  
25 client where  $x_1$  is a constant,  $x_2$  equals  $x_1+n$ , and  $x_3$   
26 equals  $x_1+n+m$ . Referring to Table 3, for client John  
27 Smith, a ringing code of 0.5/0.25 refers to  $x_2$  being  
28  $x_1+0.5$  second and  $x_3$  being  $x_1+0.5+0.25$  second, where  $w_1$   
29 and  $x_1$  are constants. Similarly, the ringing code for  
30 Bob Clinton is 0.3/0.5 which refers to  $x_2$  being  $x_1+0.3$ ,  
31 and  $x_3$  being  $x_1+0.3+0.5$ , and  $w_1$  and  $x_1$  again being  
32 constants. Generally speaking, the ringing tone should  
33 not be very long. Note that generally speaking it is  
34 more reliable to use the difference between ring tones  
35 rather than timing the duration of each ring tone.

36       In utilizing the ringing protocol with  
37 communication switching devices in a central office  
38 where a switching device passes back a signal informing  
39 the calling device that the switching device is dialing

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1 and ringing the line, once the calling device receives  
2 such a signal, the calling device can determine the  
3 length of ring time and hang up accordingly. Other  
4 implementation of the above described method can be  
5 applied to other types of calling devices and/or  
6 switching devices as well.

7 A security code (client password) may be set by the  
8 client to provide additional security measures. In  
9 order to protect the e-mail device itself from theft (as  
10 well as the e-mail messages) a machine identification  
11 number (serial number) particular to each machine is  
12 used. Thus, if the e-mail device is ill-gotten by  
13 another, it will not work. The machine ID also allows  
14 the local server to identify the e-mail device machine  
15 type.

16 In facilitating mail delivery, the local server  
17 interacts with the regional server/main server and  
18 clients' e-mail devices.

19 In interacting with the regional server, referring  
20 to Fig. 17a, the local server checks for one or more new  
21 mailbags from the regional server every x minutes. If a  
22 new mailbag is found, the mailbag is decompressed, mail  
23 messages are extracted from the mailbag and placed into  
24 the mailbox for the particular client.

25 Referring to Fig. 17b, every so often each client's  
26 mailbox is checked to see if there are any e-mail  
27 messages need to be delivered. If the mailbox for the  
28 particular client is not empty, the e-mail message(s) in  
29 the mailbox is delivered via the designated  
30 delivery/notification method for the particular client,  
31 i.e., one of the available delivery/notification  
32 methods. For each of the delivery/notification methods,  
33 there is a corresponding procedure call.

34 For the notify-only method, referring to Fig. 17c,  
35 the last time the local server interacted with the  
36 client's e-mail device (logon time) is fetched. If no  
37 new mail has arrived since the last logon time, the  
38 process ends. If there is one or more new e-mail  
39 messages and no notification has been sent to clients'

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1 e-mail devices yet, the ringing protocol described above  
2 is applied. First the local server calls the client's  
3 e-mail device. If the client's phone line is busy, the  
4 local server waits a few minutes before attempting to  
5 call the e-mail device again. If the phone line is not  
6 busy, the local server, through its interfacing  
7 hardware, detects the ring tone for  $x_1$  period of time  
8 and hangs up, wait  $w_1$  period of time, and calls the e-  
9 mail device again. If the line is busy, the process  
10 starts over after waiting a certain period of time.  
11 Otherwise, the local server detects ring tone for  $x_2$   
12 period of time and disconnects. The local server calls a  
13 third time, rings for  $x_3$  period of time and hangs up.  
14 This completes the notification process.

15 For the call-back mail delivery method, referring  
16 to Fig. 17d, the above described notification process is  
17 used, and the local server sets the hardware  
18 communication device in auto answer mode. If the  
19 client's e-mail device calls back before the end of a  
20 specified time period, a handshaking process is executed  
21 to verify the security code and the machine code. Then,  
22 any outgoing mail messages is retrieved from the e-mail  
23 device and any incoming mail is delivered to the e-mail  
24 device. When the file exchange process is completed,  
25 the line is disconnected, a confirmation signal on the  
26 successful delivery of the e-mail messages is sent to  
27 the main server via the regional server, and any  
28 outgoing mail messages is sent to the main server via  
29 the regional server as well. If the e-mail device does  
30 not call back after a set period of time and if the try-  
31 counter (that keeps count the number of tries) exceeds a  
32 maximum try value for the delivery of the messages, it  
33 is deemed that mail delivery has failed and an error  
34 messages is generated and sent to the regional server to  
35 forward to the main server. Otherwise, the try-counter  
36 is incremented and the program flow starts from label 2  
37 again to repeat the process.

38 For the direct mail delivery method, referring to  
39 Fig. 17e, a try-counter is initialized and the local

1 server calls the client's e-mail device. If the e-mail  
2 device fails to respond, the try-counter is incremented;  
3 and if the try-counter is greater than a maximum try-  
4 counter value, an error is deemed to have occurred and  
5 an error message is generated and sent to the server.  
6 Otherwise, the process is repeated by branching off to  
7 label 3. If the e-mail device responds, the process for  
8 handshaking, exchanging of any outgoing and any incoming  
9 e-mail messages, sending of a confirmation signal, and  
10 sending of any outgoing mailbag as above described for  
11 the call-back mail delivery process is executed.

12 In the handshaking process, referring to Fig. 17f,  
13 the security code is first verified. If the security  
14 code is incorrect, the handshaking process stops and  
15 down stream procedures are not executed. This condition  
16 is reported to the regional server and the main server  
17 for special handling. The machine ID verification  
18 process of the e-mail device is similar to the security  
19 code verification process.

20 In the exchange-mail-files process, referring to  
21 Fig. 17g, the local server connects to the e-mail device  
22 and retrieves any outgoing mail from the e-mail device.  
23 Next, the amount of available storage in the e-mail  
24 device is determined. If the size of the incoming mail  
25 messages is greater than the available storage size, the  
26 incoming mail messages are repackaged. The repackaged  
27 incoming mail is then sent to the e-mail device, and the  
28 process ends. In repackaging the incoming mail  
29 messages, referring to Fig. 17h, the incoming mail  
30 messages are sorted in order of priority where priority  
31 is determined by factors such as the priority code of  
32 the message and the date and time stamp of the message.  
33 The ordered messages are then selected in order of  
34 priority up to the available storage space but leaving  
35 space for a system e-mail message to the client that  
36 there are additional messages waiting for retrieval or  
37 delivery.

38 A priority code of the present invention can be  
39 included as part of the e-mail address itself by

1 comparing a number in the e-mail address itself to the  
2 security code. For example, for jsmithe@emalysys.com  
3 having a security code of "124", an e-mail address such  
4 as "jsmith\_123@emailsys.com" would have a higher  
5 priority than an e-mail address such as  
6 "jsmith\_456@emailsys.com" because the number "123" is  
7 closer to the security code of "124" than the number  
8 "456" is to "124". Thus, by having a single e-mail  
9 address, the owner of the e-mail address can give out e-  
10 mail addresses with different priority codes.

11

12 **Client E-Mail Device - Software**

13 The client's e-mail device has both a hardware  
14 component as well as a software component. The e-mail  
15 device can communicate with the local server, regional  
16 server, main server, or another e-mail device (for peer-  
17 to-peer communication).

18 Referring to Appendix A, the software pseudo-code  
19 for the client's e-mail device is illustrated. When the  
20 device is first turned on, a power-on self-test is  
21 executed. If there is a fatal failure, the program flow  
22 branches to the Fatal\_Error\_Stop label, sets the fatal  
23 error indicator, and halts the system. If a minor  
24 failure occurred, the program flow branches to the  
25 Warning\_Code label, sets a warning code indicator and  
26 resumes the program flow. Next, the phone line status  
27 is checked. If it is busy, the device will wait until  
28 the line is not busy. The e-mail device is then placed  
29 in auto-answer mode and the registers for the device are  
30 initialized for operation. If there is any failure  
31 during this initialization process, a warning code is  
32 posted. After the initialization process, the software  
33 continuously loops to check for an interrupt from the  
34 interrupt registers. If an interrupt is found, the  
35 program branches to the Interrupt\_Service routine. The  
36 Interrupt\_Service routine reads the interrupt register,  
37 determines the interrupt type, and branches to the  
38 corresponding interrupt routine.

39 An interrupt may be caused by one of the several

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1 subsystems, where the types of interrupts include  
2 registration request interrupt, call-back mail delivery  
3 interrupt, dial server interrupt (which calls the same  
4 procedure as that of the call-back mail delivery  
5 interrupt), incoming mail delivery interrupt, and  
6 transfer-abort interrupt.

7 If the call-back interrupt flag is set, the call-  
8 server routine is executed where the communication  
9 module is set to dial the local server phone number and  
10 execute an In\_Mail routine.

11 The In-Mail routine first performs handshaking with  
12 the local server communication module. It then sends  
13 out any outgoing mail messages prepared by the client,  
14 and requests and receives a confirmation signal from the  
15 local server. If the confirmation signal from the local  
16 server is incorrect, the outgoing mail messages are sent  
17 again by branching the program flow to label SendM.  
18 Otherwise, the device is instructed to receive incoming  
19 mail messages. If the incoming mail messages are not  
20 received correctly, a confirmation signal is generated  
21 to sent to the local server which would cause the local  
22 server to deliver the mail messages again. When the  
23 messages are correctly received, the mail indicator is  
24 set.

25 In the handshaking routine, the device receives the  
26 security code from the local server, verifies the code,  
27 and branches to the Bye routine if it is incorrect.  
28 Similarly, the device receives the machine ID, verifies  
29 the ID, and goes to the Bye routine if it is incorrect.  
30 The device then sends the security code and the  
31 available storage size to the local server.

32 Back to the Interrupt\_Service routine, if the  
33 Incoming\_Mail interrupt flag is set, the program flow  
34 branches to the In\_Mail routine as described above.

35 If the Registration\_Request interrupt flag is set,  
36 this flag indicates that the client has placed the  
37 device in registration mode in order to register with  
38 the main server. This process is generally executed  
39 when the device is being set up for the first time or

1       when the device has been moved to a new location. The  
2       program flow branches to the Registration\_Request  
3       routine, where the device dials a designated phone  
4       number for registration. Generally, this is a 800 toll  
5       free number connected to the main server. When  
6       connected, the device delivers the machine ID, the  
7       security code, and the client's phone number to the main  
8       server. The main server determines the particular local  
9       server for serving the client's e-mail device based upon  
10      the given phone number. The phone number for the  
11      particular local server is sent to the client device,  
12      and the client device retains the number in memory for  
13      later use.

14       The dial\_server interrupt flag is set by the client  
15      to send and retrieve mail messages. Like the call\_back  
16      interrupt, it calls the call\_server routine.

17       In the case where the local server is using the  
18      direct mail delivery method, the Incoming-mail flag is  
19      set and the In\_Mail routine is executed as described  
20      above.

21       In the case where a request has been made to  
22      disconnect the line, the Transfer-Abort flag is set  
23      which causes any phone connection to be disconnected.

24       In the case where the hardware for the e-mail  
25      device is part of another computer system (e.g. personal  
26      computer system) in the form of an expansion card or a  
27      part of an expansion card, the interface with the e-mail  
28      device can be integrated with a mail program of the  
29      computer.

30

#### 31       Client E-Mail Device - Hardware

32       The hardware component of the e-mail device may be  
33      embodied in several different manners. In one form, the  
34      e-mail device is a low-cost stand alone device directly  
35      connected to the phone line before the phone line is  
36      connected to other devices (e.g. answering machine, fax  
37      machine, etc.). The stand-alone embodiment interacts  
38      with the e-mail system as described above. More  
39      particularly, the software for the e-mail device as

1 described above is configured and stored in the ROM of  
2 the e-mail device.

3 In another hardware embodiment, the e-mail device  
4 is an integral part of a computer expansion card having  
5 power supplied from two sources, the computer system  
6 itself or an external power supply. Referring to Fig.  
7 18a, an expansion card 1050 having an edge connector  
8 1052 is illustrated. The expansion card is insertable  
9 into an edge connector slot connected to the bus of a  
10 computer system. The expansion card includes a CPU 1054  
11 (or microcontroller) directly polling an I/O register  
12 1056 that is communicatively connected to a notification  
13 module 1058. The I/O register 1056 receives information  
14 from the notification module 1058 and the user input and  
15 control device 1057 (which can be a keyboard, a keypad,  
16 dip switches, etc.) for entering security code, e-mail  
17 messages, or other inputs, and generates signals for  
18 indicators 1059 to indicate the status of any messages  
19 and the e-mail device. The notification module sends  
20 and receives information via a phone line connection and  
21 interacts with the communication module 1062. When the  
22 expansion card is inserted into the computer system, a  
23 bus controller 1064 controls the data flow to and from  
24 the computer system (not shown) via the edge connectors  
25 1052. Information is passed between the flash memory  
26 1066, the ROM 1068, the RAM 1070, the CPU 1054, and the  
27 communication module 1062 through an internal bus 1072.  
28 The communication module can be a fax/modem chipset.  
29 The expansion card 50 may be powered by one of two  
30 sources, power from the computer system via trace 1074  
31 or power from an external source via trace 1076 and  
32 power jack 1078. The power switching and conversion  
33 module 1080 detects power from one of the two sources,  
34 performs any power conversion from one voltage level to  
35 another voltage level if it is needed, and routes the  
36 power to the components on the expansion card 1050. The  
37 power detection and switching is automatically performed  
38 without interruption to the operation of the e-mail  
39 device. Thus, no interruption of operation would occur

1 if power is switched in the midst of sending or  
2 receiving e-mail messages.

3 In this embodiment, when the computer system is on,  
4 the expansion card may be controlled and operated by the  
5 software of the computer system. When the computer  
6 system is off, unattended, or not controlled by the  
7 software of the computer system, the expansion card  
8 obtains its power supply from an external source and  
9 operates in accordance with the software described  
10 above.

11 Mailing program on the computer system having the  
12 e-mail expansion card would have software routes for  
13 sending and retrieving e-mail messages between the  
14 computer system and the e-mail expansion card.

15 Referring to Fig. 18b, the pseudo-code for the computer  
16 system to retrieve e-mail messages from the expansion  
17 card is illustrated. The status of the card is first  
18 verified. If the card is not busy, the in-mail message  
19 flag (indicating the existence of new e-mail messages)  
20 is checked. If there is a new message, the message is  
21 transferred to the computer system and the storage area  
22 is cleared. Then, the message is displayed on the  
23 computer screen of the computer system. Referring to  
24 Fig. 18c, the pseudo-code for the computer system to  
25 transfer prepared e-mail messages to the expansion card  
26 for outbound is illustrated. If the card status is not  
27 busy and if there is enough storage space to store all  
28 of the e-mail messages, the e-mail messages are  
29 transferred to the expansion card and the computer can  
30 be turned off. If the storage on the card is  
31 insufficient, the user is informed to wait until the  
32 messages are sent before turning the computer off.

33 In yet another hardware embodiment, referring to  
34 Fig. 19a, the communication module of Fig. 18a is a  
35 commonly available external fax/modem. For an external  
36 modem, its serial port 1086 may be connected to the  
37 serial port of the computer system. The expansion card  
38 1082 (now without the communication module) communicates  
39 with the modem 1084 through serial port 1086. The

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1 notification device may be connected to the modem via  
2 standard phone jacks and a phone line 1088. In this  
3 embodiment, the cost of the expansion board now without  
4 the communication module is reduced. A phone line  
5 signal would come in on jack 1090 and be processed in  
6 the same manner as described above.

7 Fig. 19b illustrates the embodiment for an internal  
8 modem where the e-mail expansion card 1082 is mounted on  
9 the mother board 1083 and has a phone jack 1092 for  
10 receiving the phone line and phone signal and a phone  
11 jack 1093 for passing the phone signal to the modem card  
12 1094 via phone line 1097. The modem card 1094 is  
13 mounted on the mother board 1083 as well and receives  
14 the phone signal at phone jack 1095 and passes the phone  
15 signal out at phone jack 1096. The e-mail expansion  
16 card directly communicates with the modem card via  
17 ribbon 1098. Ribbon 1098 on one end is communicatively  
18 attached to the expansion card 1082 and on the other end  
19 it can be a ribbon cable inserted into a bus connector  
20 slot 1105 of the mother board along with the modem card.  
21 Fig. 19c shows that the ribbon cable 1098 at the end  
22 having three contact surfaces 1099, 1101, and 1103.  
23 Contact surface 1103 makes electrical contacts with  
24 selected tabs on one side 1107 of the edge connector of  
25 the modem card 1094 and selected tabs on one side of the  
26 bus slot 1105. Contact surface 1101 makes physical  
27 contact (but no electrical contact) with the bottom of  
28 the bus connector slot 1105. Contact surface 1099 makes  
29 electrical contact with selected tabs on the other side  
30 of the edge connector of the modem card 1094 and  
31 selected tabs on one side of the bus slot 1105. In this  
32 manner, the modem card can communicate with the computer  
33 system and the e-mail expansion card, and the e-mail  
34 expansion card is allowed a greater amount of direct  
35 control over the modem card. In the case where power is  
36 being supplied by an external source, the power can be  
37 supplied to the modem card through certain of the  
38 selected tabs.

39 Note that in both Figs. 19a and 19b, the e-mail

1 expansion card optionally can have complete control over  
2 the external or internal fax/modem where all  
3 communication between the CPU and the fax/modem has to  
4 pass through the e-mail expansion card. In another  
5 word, the e-mail expansion card can encapsulate the  
6 fax/modem. In Fig. 19b, encapsulating can be achieved  
7 by providing a ribbon cable having printed traces on one  
8 side and non-conductive material on the other side. The  
9 modem card nevertheless is inserted into the bus slot  
10 but it does not communicate through the traces in the  
11 bus slot. Conventional methods can be applied as well  
12 where the e-mail expansion card and the internal modem  
13 card are connected via simple ribbon and connectors on  
14 each card.

15 In yet another embodiment of the invention,  
16 referring to Fig. 19d, the e-mail device 1130 is a  
17 stand-alone card having a slot connector 1144 able to  
18 receive a regular fax/modem card 1132. The e-mail  
19 device has a connector 1138 for receiving ac or dc power  
20 supply, a communication port 1136 (such as a serial  
21 port), and a phone jack for receiving a phone line 1134  
22 and also a jack for passing a phone signal to another  
23 device 1135. Likewise, the fax/modem card 1132 has a  
24 jack for receiving a phone signal 1142 and a jack for  
25 passing through a phone signal 1143. This embodiment  
26 can be placed in a physical box.

27 Further note that although the e-mail device is  
28 illustrated as an expansion card it can be easily  
29 converted into an external device like that of the  
30 common external fax/modem device. Moreover, the  
31 expansion card can be converted to a stand alone device  
32 with a display. Moreover, communication devices are not  
33 limited to the fax/modem devices illustrated above.  
34 ISDN devices, cable modem, wireless modem, or other  
35 communication devices can be used as communication  
36 devices as well.

37 The hardware embodiment for implementing the  
38 ringing protocol described above requires a tone  
39 detection circuit. Referring to Fig. 20, on the local

1 server side, the local server provides the dialing and  
2 answering functionalities 1052 through the use of a  
3 modem 1057 or other communication devices or modules.  
4 The modem controls the phone line 1055 to dial the  
5 telephone number of the client's e-mail device, and the  
6 tone detection circuit 1053 detects the ringing tone and  
7 reports it to the local server 1056. The local server  
8 determines the length of ringing time and instructs the  
9 modem to disconnect when the predetermined period of  
10 time has been reached.

11 On the client e-mail device end, the notification  
12 device 1054 detects the ringing signal, the time lapsed  
13 for each ringing signal and the time lapsed between the  
14 signals. It then determines whether a valid  
15 notification code has been received. Referring to Fig.  
16 21, on the client side, the microcontroller 1058  
17 operates a ringing signal detection circuit 1049 and a  
18 modem 1047 in detecting whether a valid ringing code has  
19 been received.

20

21 **Integration of the E-Mail Device**

22 The above described e-mail device may be integrated  
23 into other devices. For example, the e-mail device may  
24 be part of a phone, a fax machine, an answering machine,  
25 etc. If the e-mail device is integrated with a fax  
26 machine, e-mail messages can be readily printed out and  
27 any outgoing mail messages may be composed through the  
28 use of the numeric keypad. Fig. 22 illustrates one  
29 embodiment of the e-mail device integrated with a fax  
30 machine. In this embodiment, there is a transmitter  
31 subsystem 1100, a receiver subsystem 1102, and a modem  
32 1104 that can be connected to a telephone line 1106.  
33 The modem incorporates a control module 1125 to execute  
34 the ringing protocol described above and distinguishes a  
35 fax/modem signal from an e-mail message signal (or  
36 protocol) to activate the corresponding portion of the  
37 circuitries.

38 The transmitter 1100 can process two signals, one  
39 signal for faxing and one signal for mailing messages.

1   For faxing a document, the document is first scanned by  
2   a scanner 1108 and the scanned signal is converted to a  
3   digital format 1110. For mailing messages, the prepared  
4   mail messages are stored in memory 1114 and converted to  
5   raster graphic image 1126. Note that a number of  
6   methods are available for composing mail messages,  
7   including the use of a keyboard, a keypad, etc. The  
8   composed messages are then stored in memory. A  
9   multiplexer 1116 selects one of the two signals to pass  
10   through to the compressor 1112 and then to the modem  
11   1104 for transmission in accordance with the selected  
12   mode.

13       The receiver subsystem 1102 processes incoming fax  
14   signal or mail message signal. For a fax signal; the  
15   signal is decompressed 1118 and sent to the printing  
16   subsystem 1122 through a multiplexer 1120. For an e-  
17   mail message signal, the signal is received and  
18   processed by an integrated e-mail device (and software)  
19   1124 as described above. The output from the e-mail  
20   device is converted to image format 1126 and sent to the  
21   printing subsystem 1122 via the multiplexer 1120.  
22   Again, the multiplexer selects the signal to be sent to  
23   the printing subsystem in accordance with the selected  
24   mode.

25

26       REMOTE CONTROL OF THE SERVERS

27       The servers can be remotely operated and control by  
28   using commercially available communication software or  
29   tailored software. The ringing protocol may be used to  
30   set and reset the servers. Appendix B illustrates one  
31   set of pseudo-code for remote controlling the servers.  
32   Referring to Fig. 23, the server computer 1210 is  
33   connected to the network 1200 via a direct connection  
34   1214 and through a modem 1212. The modem provides a  
35   remote login path to the server in order to control or  
36   maintain the server. If the server does not respond to  
37   the remote login, the ringing protocol of the present  
38   invention embodied in the notification device 1205 can  
39   be used to detect ringing pattern. Upon receiving a

-42-

1      proper ringing pattern, the notification device sends a  
2      signal to the server computer via line 1207 to prepare  
3      for shut-down and a signal to the power control module  
4      1206 to generate a pulse to toggle the relay 1202 for a  
5      proper period of time to reboot the computer.

6      The software described herein for implementation of  
7      the e-mail system can be written specifically for this  
8      particular application in the programming language of  
9      choice. It can also be implemented through the use of  
10     existing system mail utility programs. For example,  
11     under the Unix system, an entire set of mail utility  
12     programs are available for the sending and receiving of  
13     mail messages.

14     Although the present invention has been described  
15     in terms of the presently preferred and second  
16     embodiments, it is to be understood that such disclosure  
17     including combinations of the two embodiments is not to  
18     be interpreted as limiting. Various alterations and  
19     modifications including the various combinations of the  
20     two embodiments will no doubt become apparent to those  
21     skilled in the art after reading the above disclosure.  
22     Accordingly, it is intended that the appended claims be  
23     interpreted as covering all alterations and  
24     modifications as fall within the true spirit and scope  
25     of the invention.

Client software codes on communication card or on a stand alone system

**Kernel**

```
POST (Power on self-test)
If fatal failure, go to Fatal_Error_Stop
If minor failure, go to Warning_code
Check line status; if busy, wait until line is not
busy;
Set up communication module in auto-answer mode
Set up other I/O registers, devices
If any failure, go to Warning_code
loop Polling interrupt
If interrupt found, jump to Interrupt_service
go to loop
```

**Fatal\_Error\_Stop:**

```
set error indicator or display
Holt
```

**Warning\_code:** (input: warning code)

```
set warning indicator (or display)
return
```

**Interrupt\_Service:**

```
Read interrupt register
Check the interrupt type

case of:
    Call_back: jump to Call_server
    Registration request: jump to Reg_req
    Incoming_mail: jump to In_mail
    Dial_server: jump to Call_server
    Transfer_abort: jump to Tfr_abort
end case:

Clear the interrupt that has been serviced
return
```

**Call\_server:**

```
set up communication module to dial
read_server_number
dial (phone)
In_mail;
return
```

**Bye:**

```
hangup
set up communication module in auto answer mode
return
```

**In\_mail:**

```
Handshaking
sendM send outgoing mail
receive transfer confirm info.
If confirmation info not correct, go to sendM
to retry
    send available storage size
revM receive incoming mail
    send receive confirmation info
```

- 44 -

If confirmation info is not correct go to revM  
set Mail\_in indicator  
return

Handshaking:

check the security code, if not correct, go to Bye  
receive machine ID from server (if it is used)  
check the machine ID, if not correct, go to Bye  
return

Reg\_req:

dial the (800) number  
establish connection  
display greeting  
send machine ID  
send security codes  
echo the security code  
print "enter your phone number"  
read phone\_number  
send phone number  
receive and save local server number(s)  
print "registration done"  
return

Tfr\_abort:

save all data for immediate disconnection  
hangup  
return

## APPENDIX B

Remote monitor and control of the local server

{ Codes for every local server }

```
Program diag_report;
begin
    Do the following every hour
    begin
        run_diagnostics_and log results
        check any problem
        mail the report to the main server
    end
end
```

{ Codes on main server }

```
Program remote_monitor;
begin
    Do the following for every hour
    begin
        get_new_mail: //the mail are diag report from
local server
        if there is mail
            begin
                check the report from each local server
                if there is a problem
                    begin
                        remote_dia_ctrl: //reference point
                        rlogin local server //remote login & run
diag.
                    if rlogin fail goto cold_boot
                    run more extensive diagnostics
                    if the problem is correctable correct the
program
                    else reboot // (software warmboot)
                    begin
                        wait for reboot;
                        rlgoin local server
                        if rlogin fail goto cold_boot
                        if system is okay, exit
                    else
                        begin
                            remote_shutdown_process (n,m);
                            //hardware cold boot
                            // n,m are the secret code like
                            notification device
                            wait for reboot
                            rlgoin local server
                            if system is okay, exit
                            else report problem to operator
                        end
                    end
                else
                    if it is too long for not receiving mail
                        begin
                            rlogin the local server
                        end
            end
        end
    end
end
```

- 46 -

```
    go to remote_dia_ctrl  
end
```

```
end  
end
```

{ The remote shutdown process uses a method similar to the notification device, but it requires much higher security in order to prevent unauthorized shutdown. So, the following procedure uses two codes instead of one code. Again the code represents the ring tone length difference for two consecutive dialings. The first code n is for the difference between the ringing period of the first call x1 and the second call x2, and m is for the difference between x2 and the ringing period of the third call x3. Typically, n and m are small numbers which can be positive or negative numbers. More codes can be used to achieve even greater security. }

```
process remote_shutdown_process (n,m);  
begin  
    start_point; //just a reference point  
    call (phone_number)  
        if line busy, wait and go to start_point  
    detect_ring_tone for x1 second  
    disconnect;  
    wait w1 seconds;  
    call (phone_number);  
        if line busy, wait and go to start_point  
    detect_ring_tone for x2 second //x2=x1+n  
    disconnect  
    wait w1 seconds;  
    call (phone_number);  
        if line busy, wait and go to start_point  
    detect_ring_tone for x3 seconds //x3=x2+m  
    disconnect;  
  
end
```

CLAIMS

I claim:

1    1. A telephonic electronic message apparatus for  
2 automatically receiving electronic messages comprising:  
3        a means for adapting to an existing telephone line  
4 for receiving said electronic messages; and  
5        a processing means for automatically responding to  
6 said electronic messages and for storing said messages  
7 therein whereby said electronic messages may be received  
8 and stored without requiring a human operation.

1    2. The telephonic apparatus of claim 1 further  
2 comprising:  
3        an user interface means for providing information  
4 to an user relating to a reception of said electronic  
5 messages.

1    3. The telephonic apparatus of claim 2 further  
2 comprising:  
3        a telephone adapting means for connecting to a  
4 telephone;  
5        said processing means further including a telephone  
6 interface means for detecting an incoming signal  
7 received from said telephone line and for determining if  
8 said incoming signal being an electronic message and for  
9 transmitting said incoming signal to said telephone when  
10 said incoming signal being detected is determined not an  
11 electronic message.

1    4. The telephonic apparatus of claim 2 wherein:  
2        said user interface means further including a  
3 display means for displaying a message relating to the  
4 reception of said electronic messages.

1    5. The telephonic apparatus of claim 2 wherein:  
2        said processing means further including a message  
3 storage means for storing said electronic messages  
4 therein.

1       6. The telephonic apparatus of claim 3 further  
2 comprising:  
3               an electronic message exporting means for  
4 delivering said electronic messages via a transmitting  
5 means to a receiving device.

1       7. The telephonic apparatus of claim 6 wherein:  
2               said electronic message exporting means including a  
3 television interface means for delivering said  
4 electronic messages via said transmitting means to  
5 a television for displaying said electronic  
6 messages thereon.

1       8. The telephonic apparatus of claim 7 wherein:  
2               said user interface means further including an  
3 message exporting control means for controlling a  
4 display of said electronic message on said television.

1       9. The telephonic apparatus of claim 3 further  
2 comprising:  
3               an automatic registration means for storing  
4 required registration data therein and for automatically  
5 dialing and registering with a network server for  
6 receiving said electronic messages therefrom.

1       10. The telephonic apparatus of claim 3 further  
2 comprising:  
3               a removable data storage means for storing said  
4 electronic messages therein for removably transferring  
5 said electronic messages therefrom.

1       11. The telephonic apparatus of claim 5 further  
2 comprising:  
3               a message full means for terminating a reception of  
4 said electronic messages when said message storage means  
5 reaching a full storage capacity.

1       12. The telephonic apparatus of claim 3 further  
2 comprising:

1           a message screen means for detecting designated  
2    message identifications in said electronic messages for  
3    receiving and storing said electronic messages with said  
4    designated message identifications.

1    13. The telephonic apparatus of claim 3 further  
2    comprising:

3           an automatic logon means for automatically dialing  
4    and logging on a network server periodically for  
5    receiving said electronic messages therefrom.

1    14. The telephone apparatus of claim 4 wherein:  
2           said user interface means further including a  
3    display control means including control buttons for  
4    controlling the display of different electronic  
5    messages.

1    15. A telephonic electronic message apparatus for  
2    automatically receiving electronic messages comprising:  
3           a means for adapting to an existing telephone line  
4    for receiving electronic messages including digitized  
5    signals therefrom;

6           a processing means for automatically responding to  
7    said electronic messages wherein said processing means  
8    further including a message storage means for storing  
9    said electronic messages therein;

10          an user interface means including a display means  
11    for displaying information to an user relating to a  
12    reception of said electronic messages, said user  
13    interface control means further including a display  
14    control means including control buttons for controlling  
15    the display of different electronic messages;

16          a telephone adapting means for connecting to a  
17    telephone;

18          said processing means further including a telephone  
19    interface means for detecting an incoming signal  
20    received from said telephone line and for determining if  
21    said incoming signal being an electronic message and for  
22    transmitting said incoming signal to said telephone when

1 said incoming signal being detected is determined not an  
2 electronic message;  
3 an electronic message exporting means for  
4 delivering said electronic messages via a transmitting  
5 means to a receiving device wherein said electronic  
6 message exporting means including a television interface  
7 means for delivering said electronic messages via said  
8 transmitting means to a television for displaying said  
9 electronic messages thereon;  
10 said user interface means further including an  
11 message exporting control means for controlling a  
12 display of said electronic message on said television;  
13 an automatic registration means for storing  
14 required registration data therein and for automatically  
15 dialing and registering with a network server for  
16 receiving said electronic messages therefrom; and  
17 a message full means for terminating a reception of  
18 said electronic messages when said message storage means  
19 reaching a full storage capacity.

1 16. The telephonic apparatus of claim 15 further  
2 comprising:  
3 a message screen means for detecting designated  
4 message identifications in said electronic messages for  
5 receiving and storing said electronic messages with said  
6 designated message identifications.

1 17. The telephonic apparatus of claim 16 further  
2 comprising:  
3 a removable data storage means for storing said  
4 electronic messages therein for removably transferring  
5 said electronic messages therefrom.

1 18. The telephonic apparatus of claim 15 further  
2 comprising:  
3 an automatic logon means for automatically dialing  
4 and logging on a network server periodically for  
5 receiving said electronic messages therefrom.

1       19. The telephonic apparatus of claim 15 wherein:  
2                 said telephonic apparatus being provided for  
3     receiving a plurality of message units; and  
4                 said user interface means including a message unit  
5     access Control means for controlling an access to each  
6     of said plurality of message units.

1       20. A method for providing communication between a  
2     local electronic message server and a telephone user  
3     connected with telephone line to the server comprising  
4     the steps of:

5                 (a) providing a telephonic electronic message  
6     apparatus [which including a means for adapting]  
7     adaptable to said telephone line for receiving  
8     electronic messages from said local server; and  
9                 (b) providing a processing means for said  
10    telephonic electronic message apparatus for  
11    automatically receiving electronic messages for storing  
12    said messages therein whereby said electronic messages  
13    may be received and stored without requiring a human  
14    operation.

1       21. An electronic message communication system  
2     comprising:

3                 a local electronic message server connected to an  
4     internet system for receiving said electronic messages  
5     therefrom and sending said electronic messages thereto;  
6                 a telephonic electronic message apparatus connected  
7     to said local electronic message server by a telephone  
8     line wherein said telephonic electronic message  
9     apparatus includes a means for adapting to said  
10    telephone line; and

11                 said telephonic electronic message apparatus  
12    further includes a processing means for automatically  
13    receiving said electronic messages transmitting from  
14    said local server through said telephone line for  
15    storing said messages in said telephonic electronic  
16    message apparatus whereby said electronic messages may  
17    be received and stored without requiring a human

1       operation.

1       22. The electronic message communication system of  
2       claim 21 wherein:

3               said telephonic electronic message apparatus  
4       includes a registration trigger means and an automatic  
5       registration dial-up means for automatically sending a  
6       plurality of identification messages to said local  
7       server for registration upon an actuation of said  
8       registration trigger means; and

9               said local electronic message server includes a  
10      registration processing means for receiving said  
11      plurality of identification messages for processing a  
12      registration of said telephonic electronic message  
13      apparatus in said local server.

1       23. The electronic message communication system of  
2       claim 21 wherein:

3               said telephonic electronic message apparatus  
4       includes an auto collect triggering means and an collect  
5       dial-up means for automatically sending a plurality of  
6       auto collect messages to said local server upon an  
7       actuation of said auto collect trigger means; and

8               said local electronic message server includes an  
9       auto collect processing means for receiving and  
10      responding to said plurality of auto collect messages  
11      for automatically sending a plurality of electronic  
12      messages to said telephonic electronic message  
13      apparatus.

1       24. The electronic message communication system of  
2       claim 21 wherein:

3               said local electronic message server includes an  
4       message priority processing means for checking a  
5       priority of each of said electronic messages and for  
6       sending each of said electronic messages to said  
7       telephonic electronic message apparatus according to  
8       said priority.

1       25. The electronic message communication system of  
2       claim 21 wherein:

3               said local electronic message server includes a  
4       storage capacity processing means for checking a storage  
5       capacity of said telephonic electronic message apparatus  
6       and for sending said electronic messages thereto  
7       according to said storage capacity whereby a message  
8       overflow of said telephonic electronic messages  
9       apparatus may be prevented.

1       26. The electronic message communication system of  
2       claim 22 wherein:

3               said automatic registration dial-up means provided  
4       for automatically sending a plurality of said  
5       identification messages including a telephone number, a  
6       machine number and a user password.

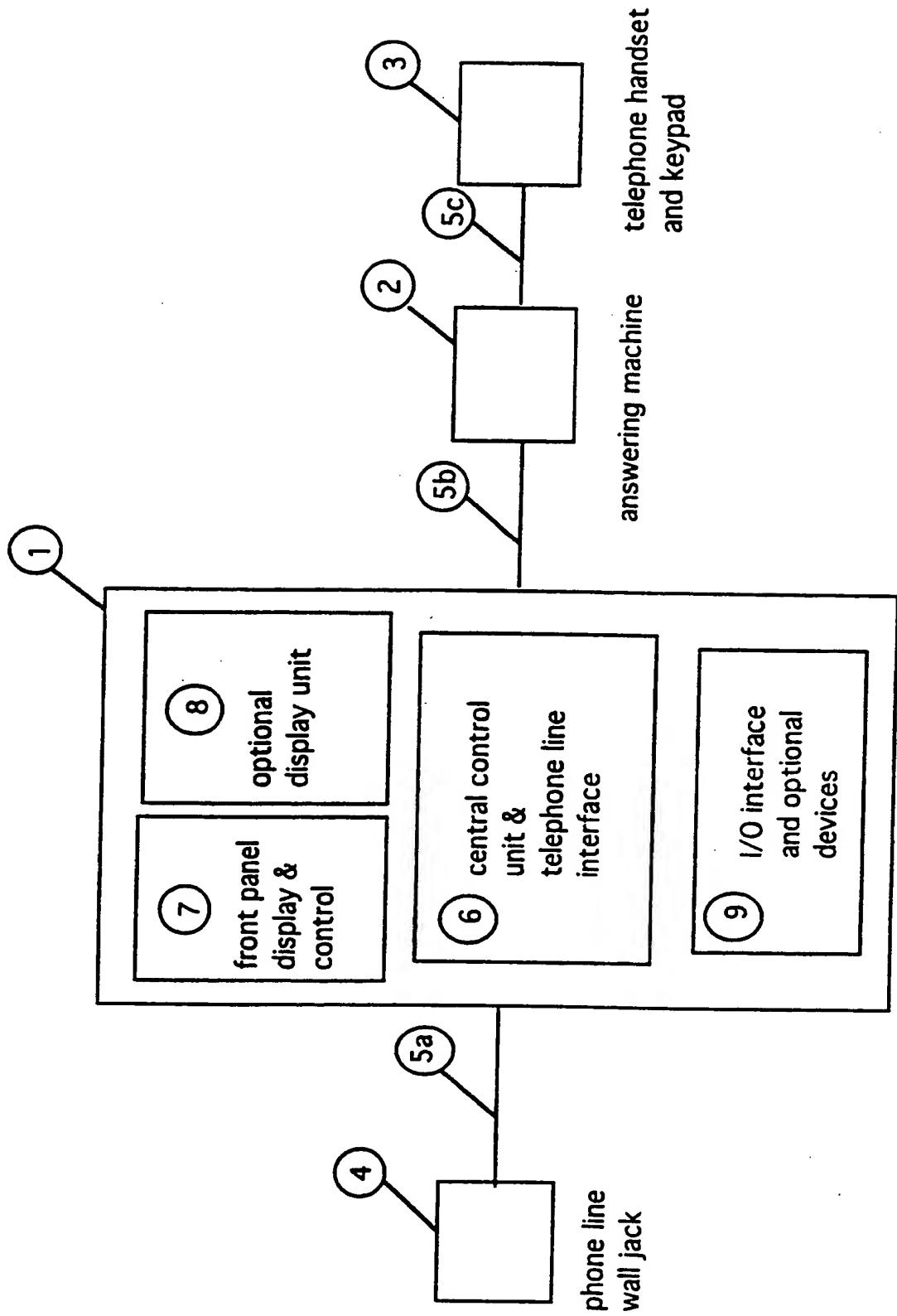
1       27. A method for sending and receiving electronic mail  
2       messages over an interconnected network of computers  
3       where one of said interconnected computers is configured  
4       to receive mail messages having a particular domain  
5       address, said configured computer electronically  
6       connected to one or more mail servers each designated  
7       for a particular geographical region and each  
8       electronically connected to one or more electronic mail  
9       messaging devices each having a particular address  
10      within said domain address for receiving electronic mail  
11      messages addressed to said particular address, wherein  
12      each of said devices contains dedicated electronic  
13      circuitries for sending, receiving, and storing  
14      electronic mail messages, said method comprising the  
15      steps of:

16               receiving one or more electronic mail messages each  
17       addressed to a particular address within said domain  
18       address;

19               determining the mail server for delivering each of  
20       the electronic mail messages in accordance to their  
21       respective particular addresses;

22               packaging the electronic mail messages for a mail

1       server into a mailbag for delivery;  
2            sending said mailbag to said mail server;  
3            unpackaging said mailbag and reconstructing the  
4        electronic mail messages from said mailbag at said mail  
5        server; and  
6            delivering each of the electronic mail messages to  
7        the corresponding electronic mail messaging devices.



**Fig. 1 connection of E-mail apparatus and telephone & answering machine**

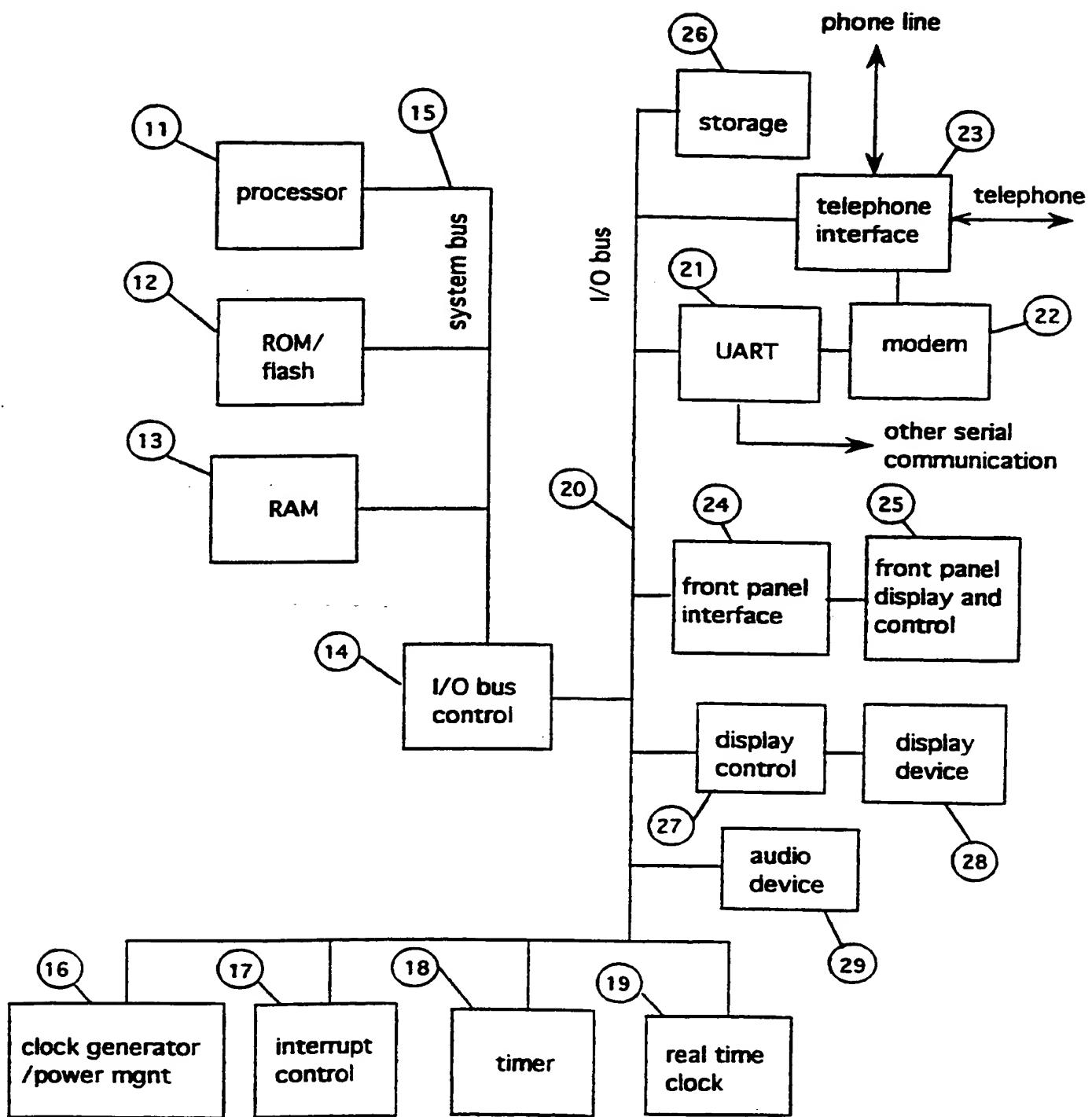


Fig 2. Block diagram of the E-mail apparatus

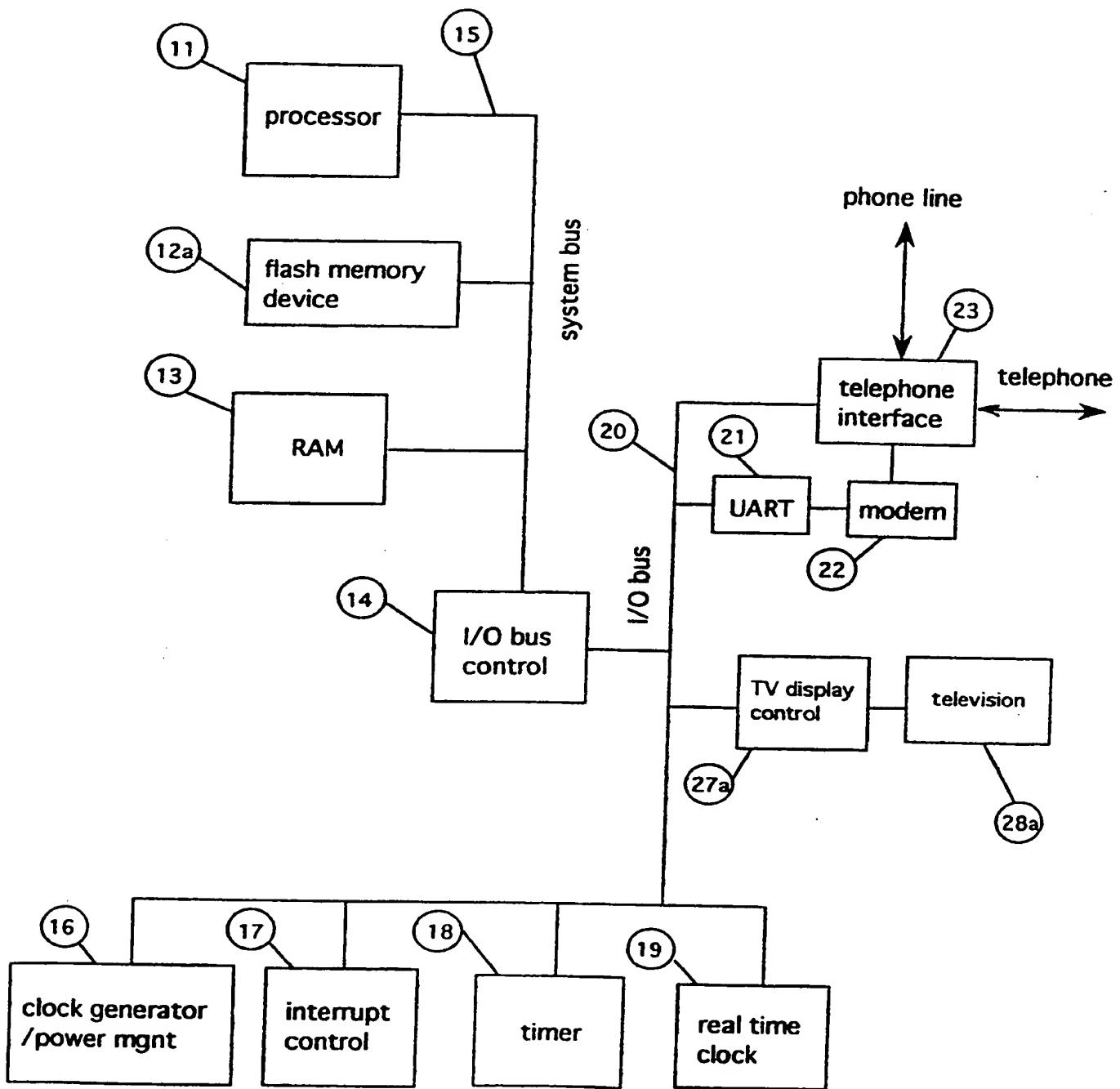
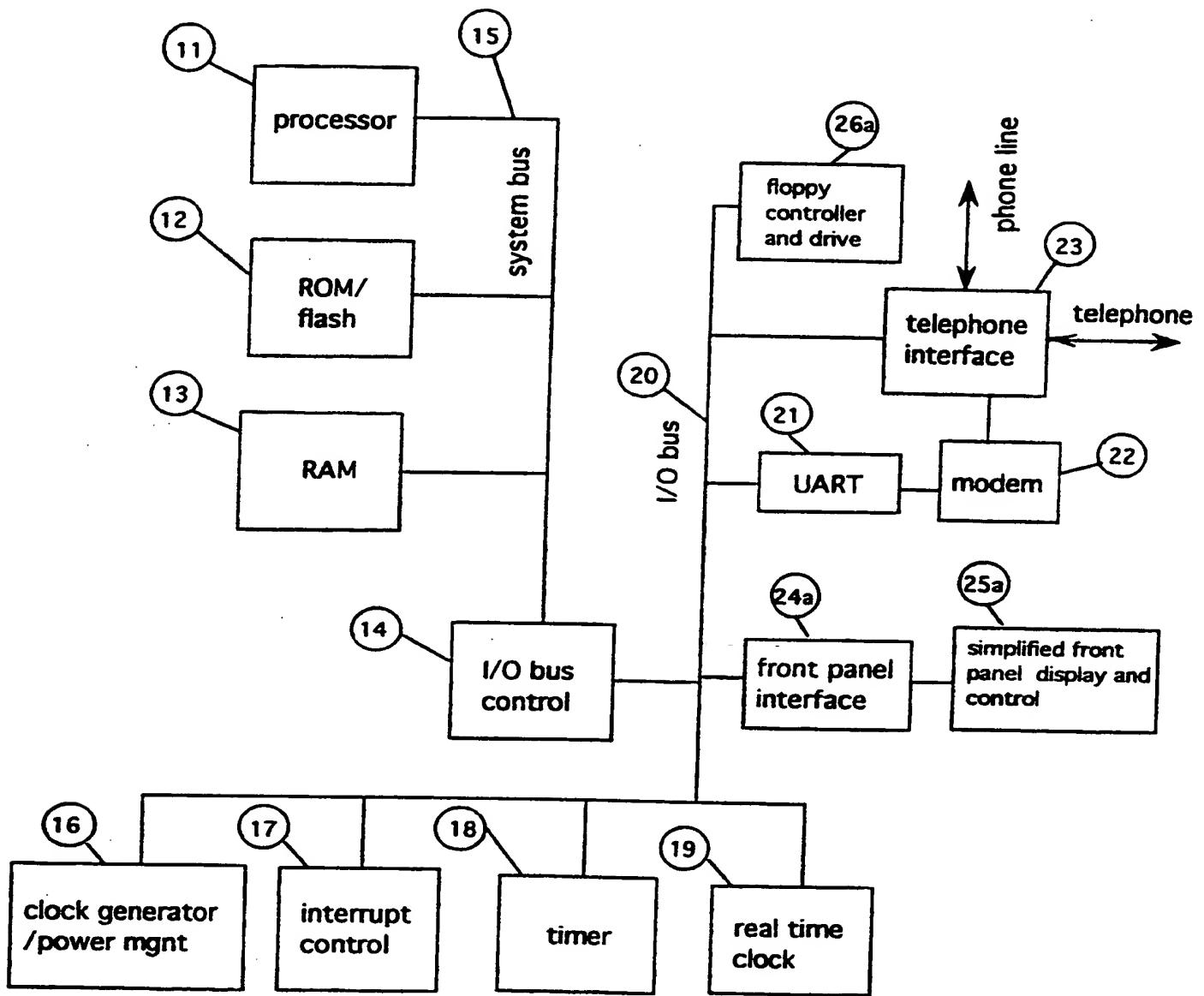


Fig 2a. Example of the E-mail apparatus implementaiton



**Fig 2b. Example of the E-mail apparatus implementation**

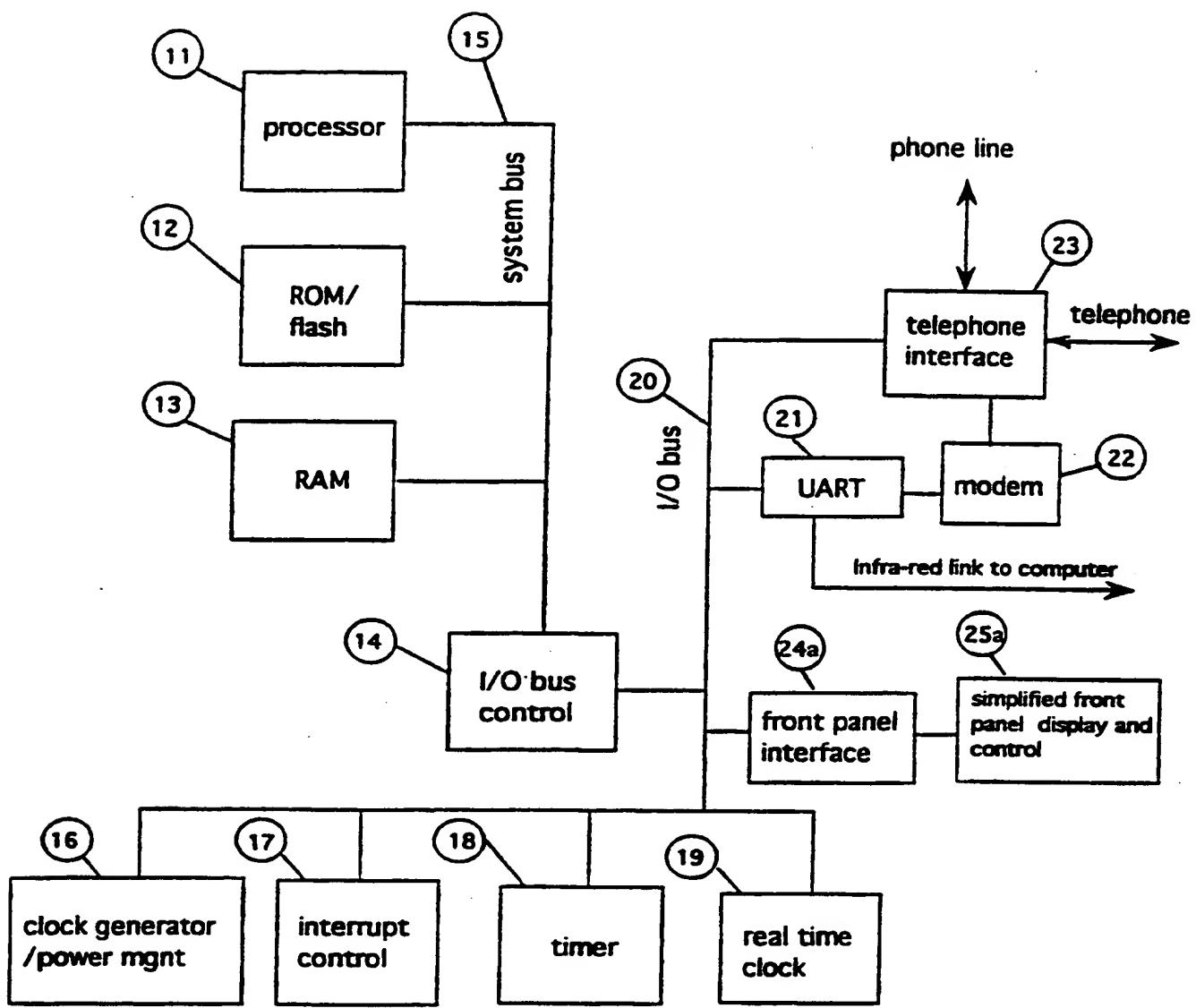


Fig 2c. Example of the E-mail apparatus implementation

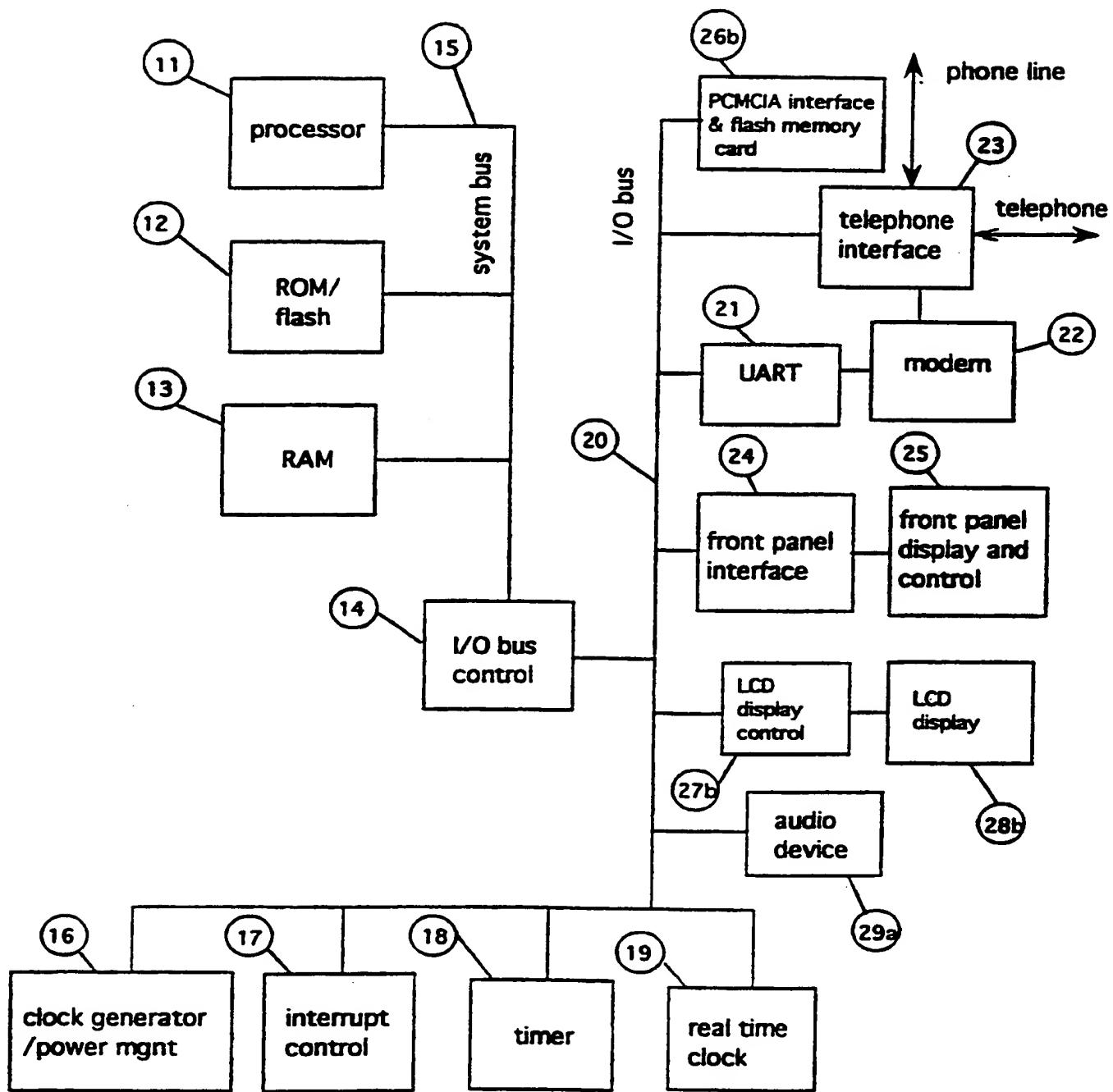


Fig 2d. Example of the E-mail apparatus implementation

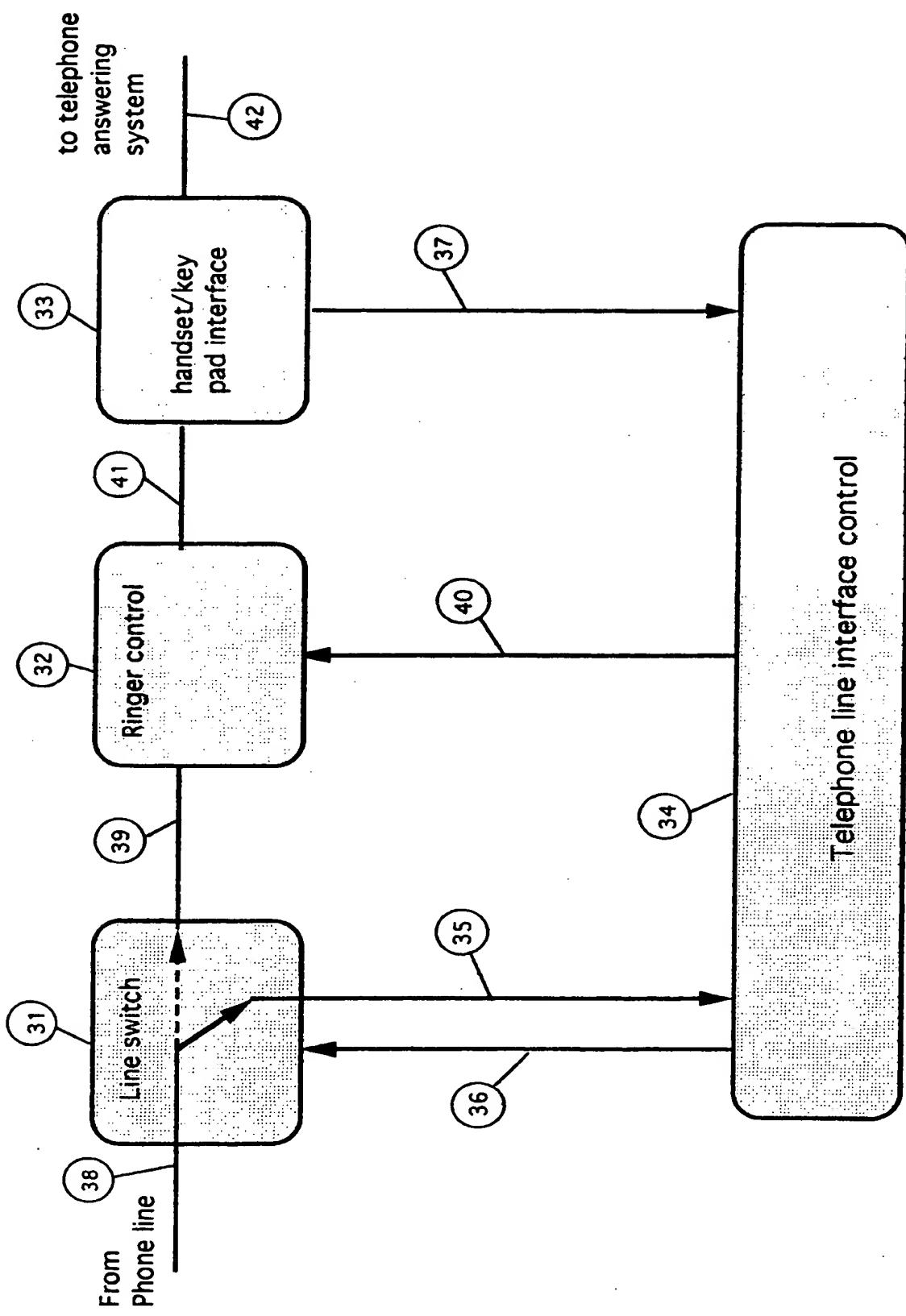
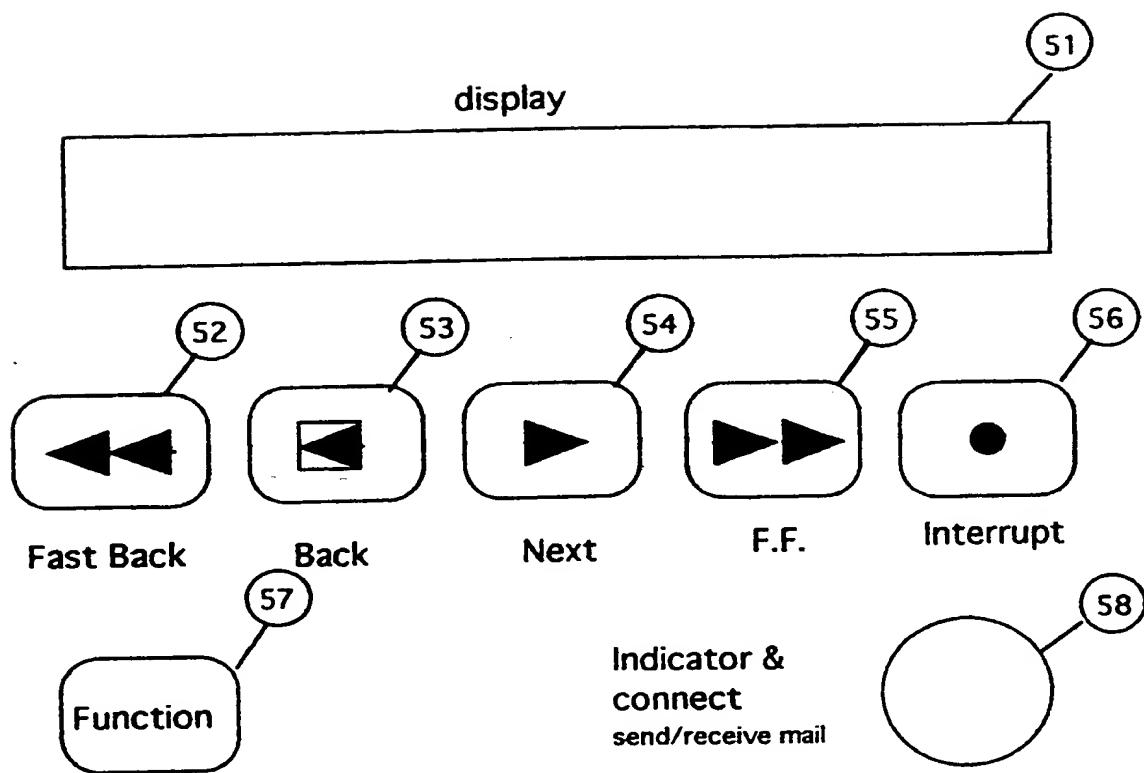


Fig. 3 Telephone interface block diagram



**Figure 4: Front panel interface**

## Special functions

1. registration
2. set current time
3. set personal code (p code)
4. change the number to dial
5. Hold mail
6. Forward mail
7. Auto-dial time
8. data import/export
9. display E-mail address
10. change E-mail address
11. Self-test

**Figure 5: Example of special functions men.**

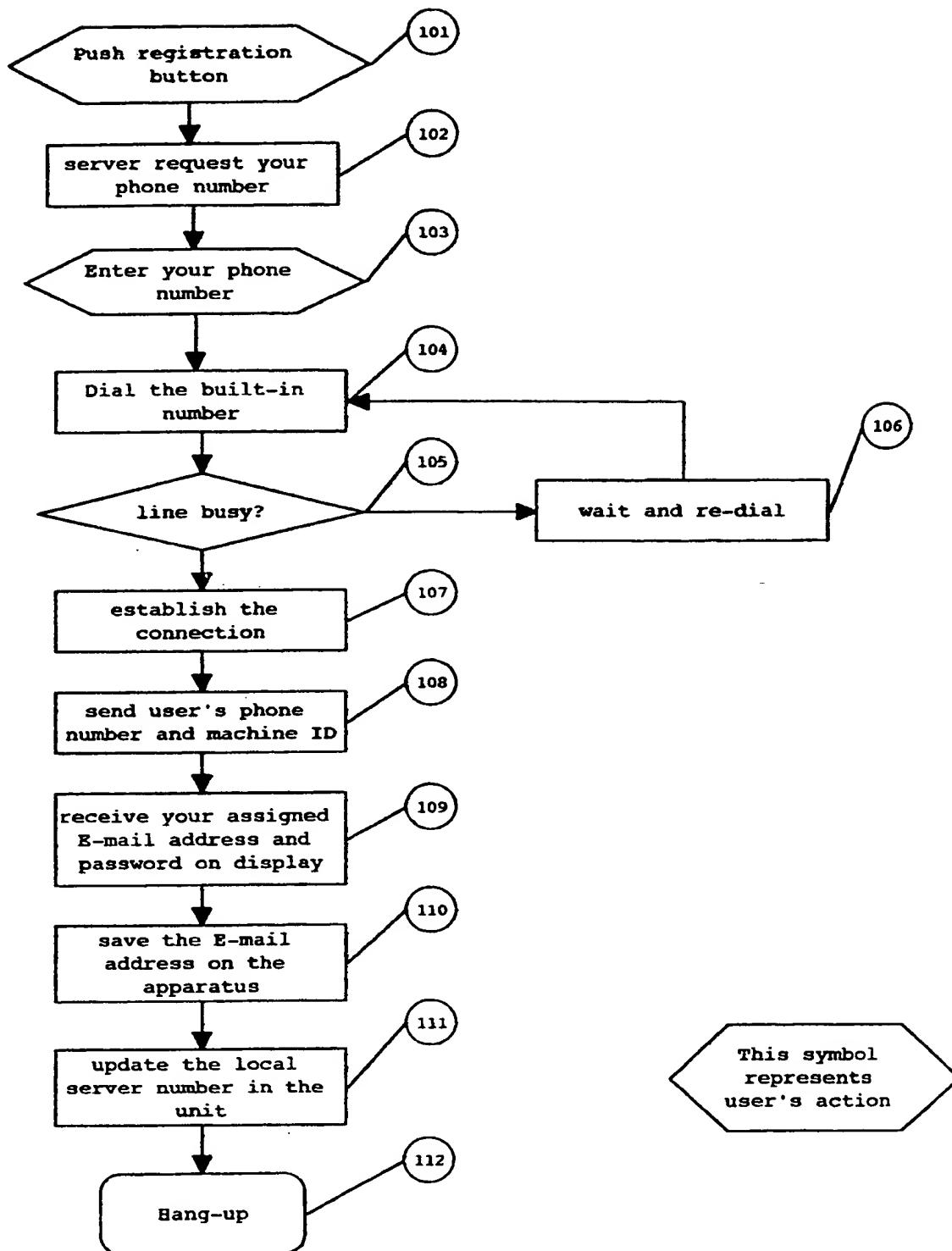


Figure 6: Easy registration flow

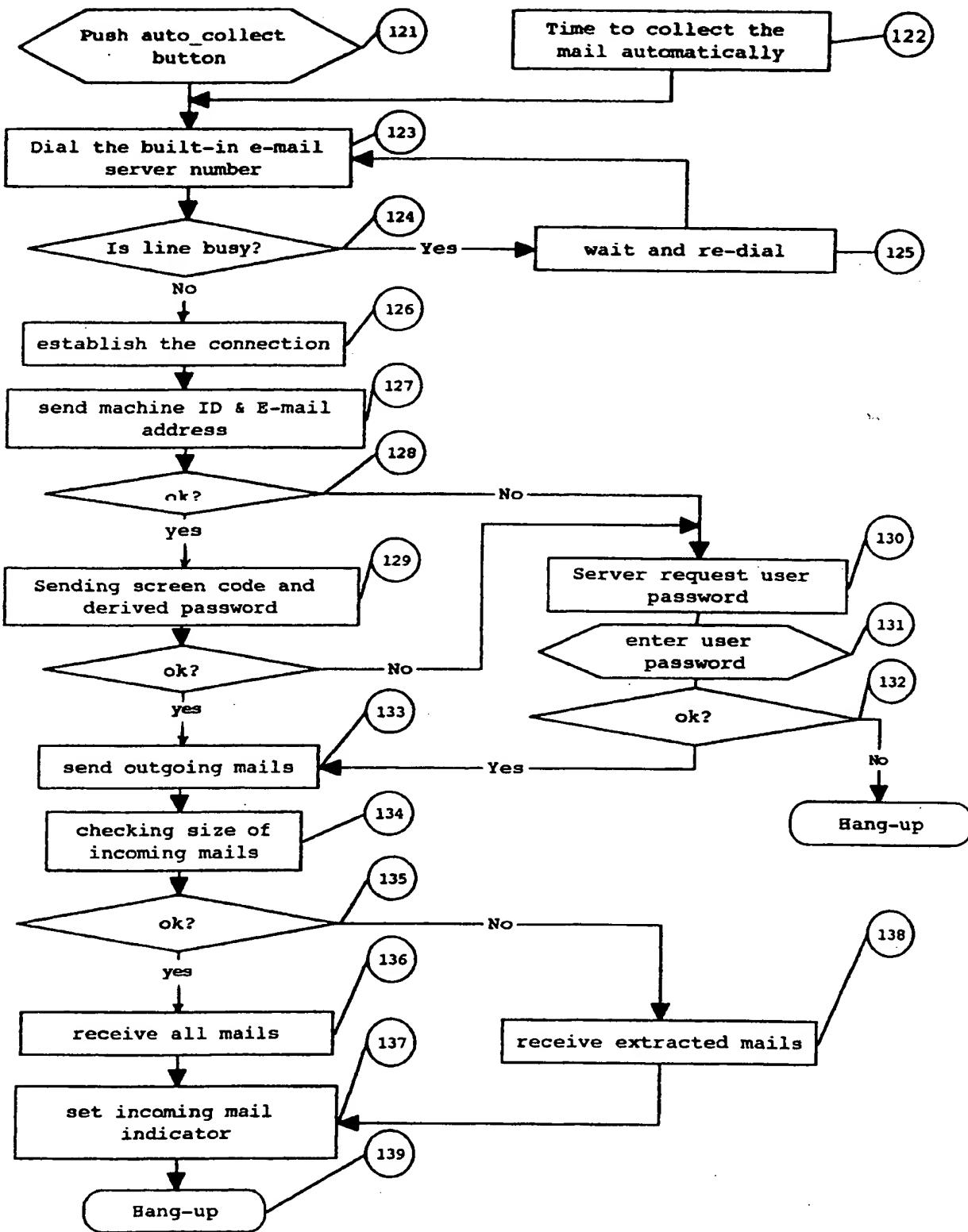


Figure 7: E-mail collect flow

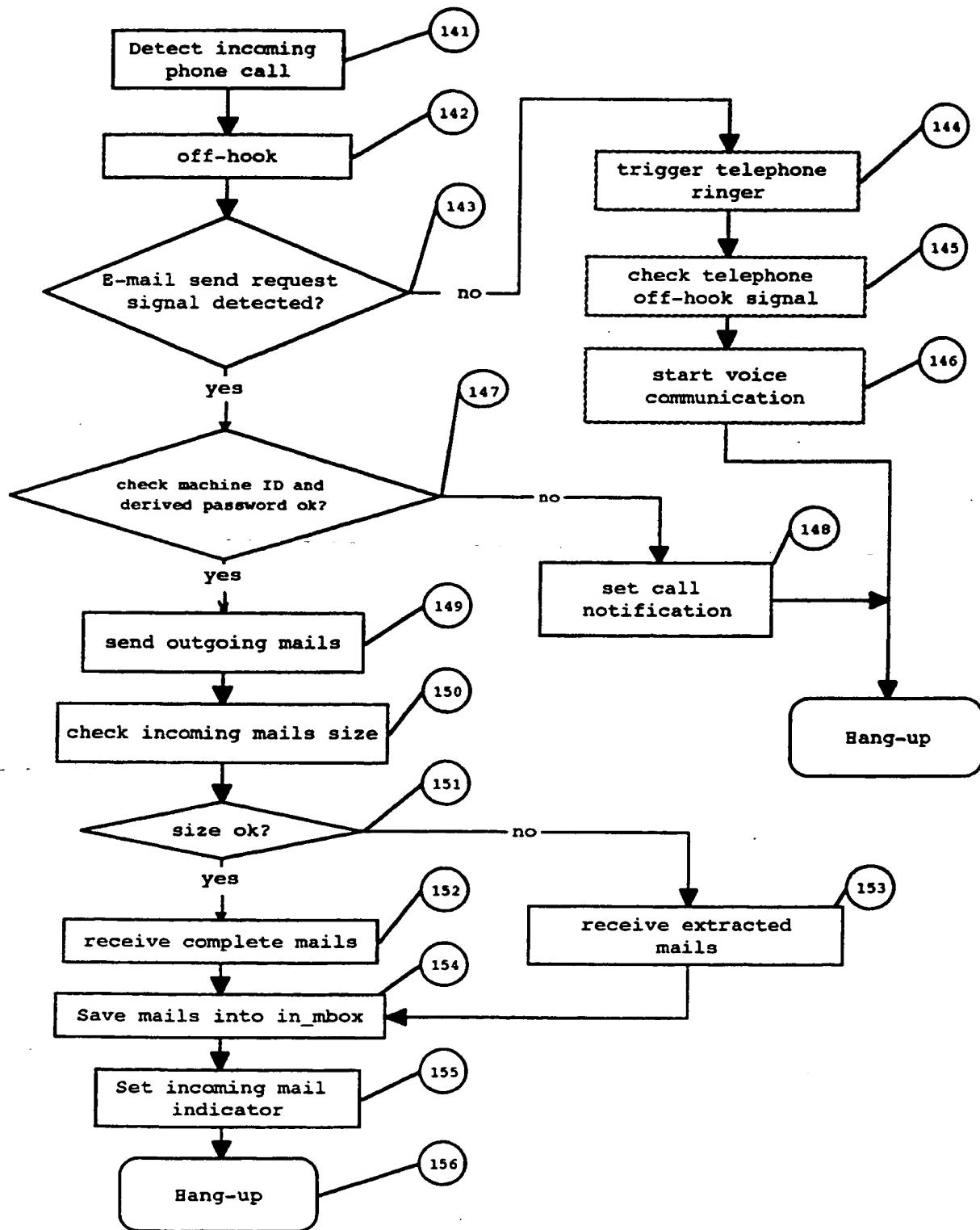


Figure 8: Apparatus's response to E-mail server delivery request

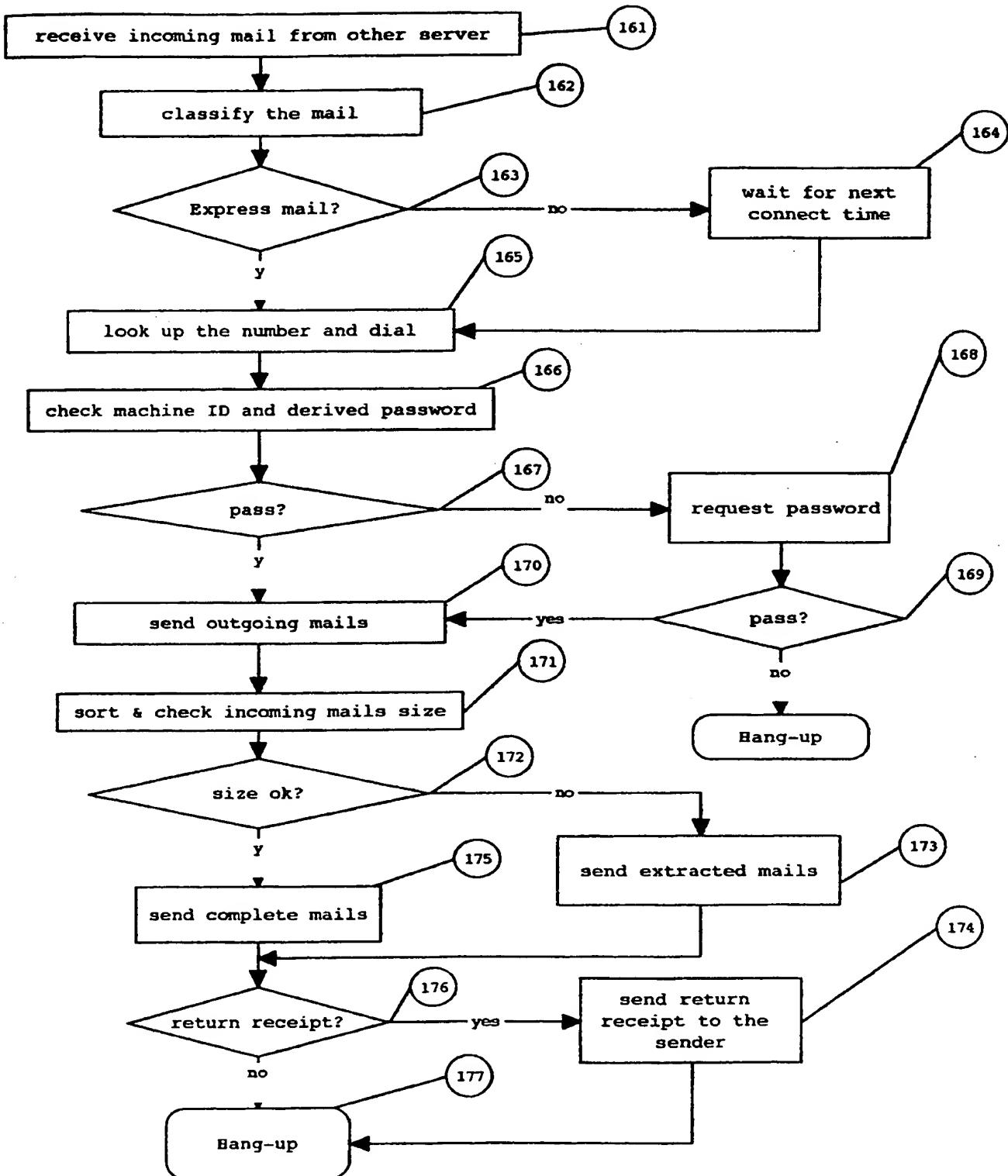


Figure 9:E-mail server mail process flow

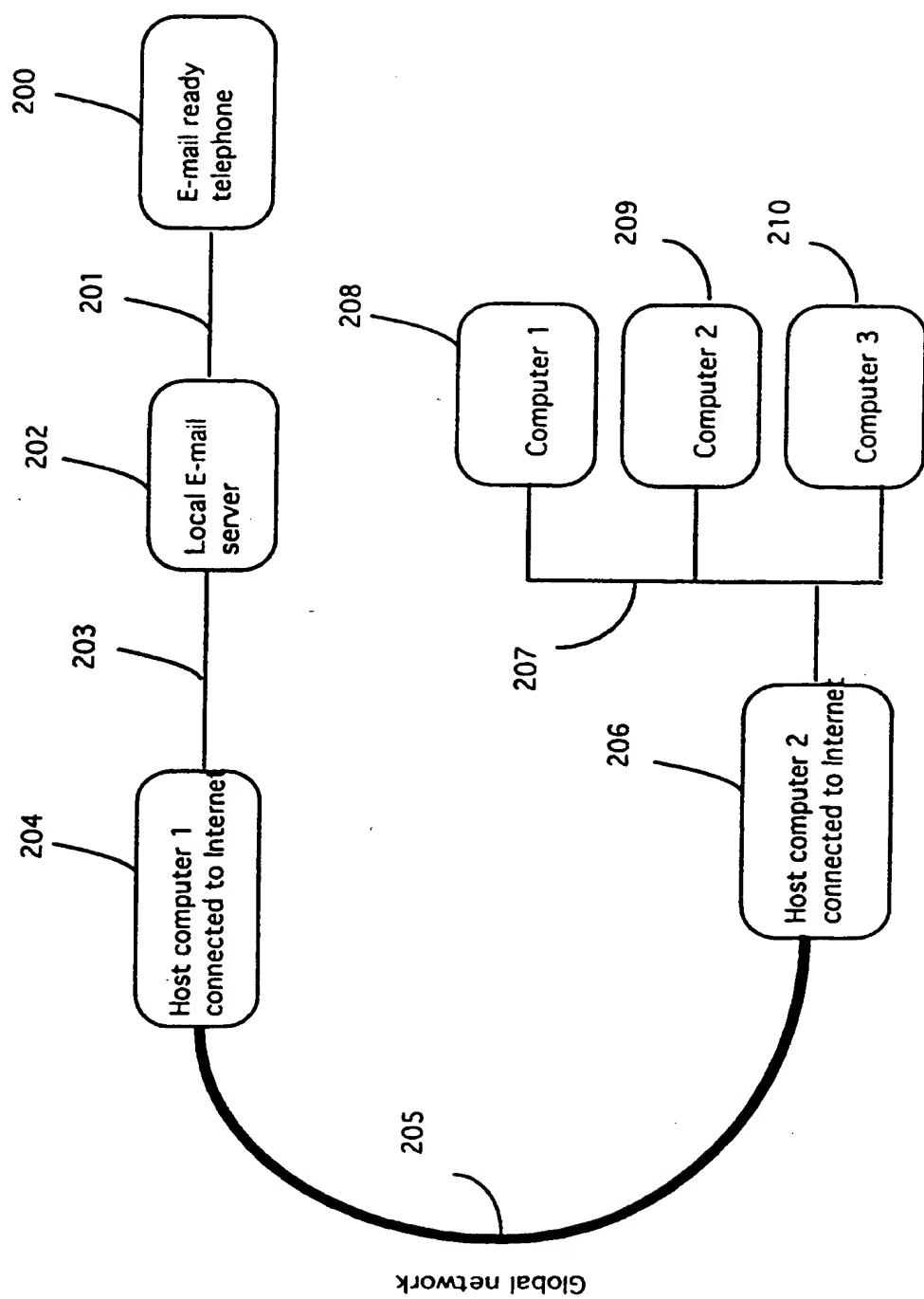


Fig. 10 Network connection diagram

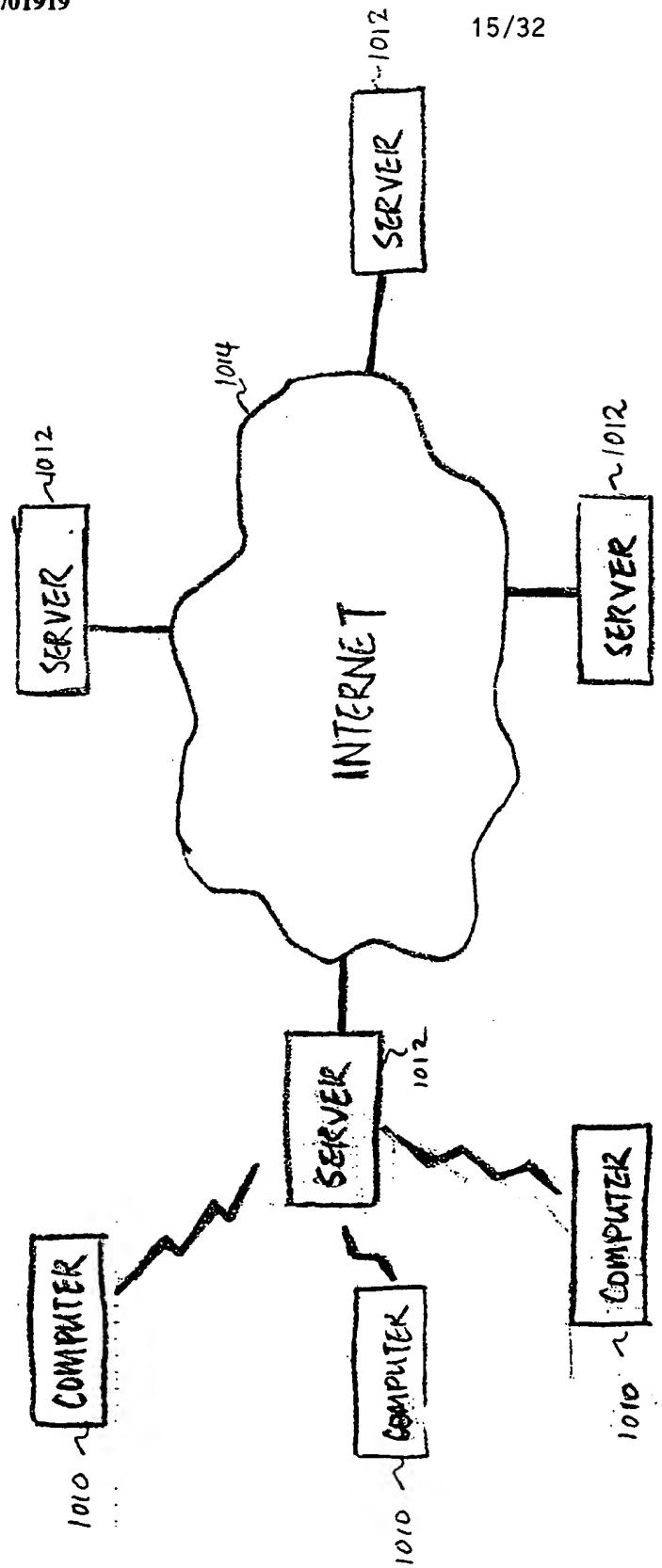


fig. 11

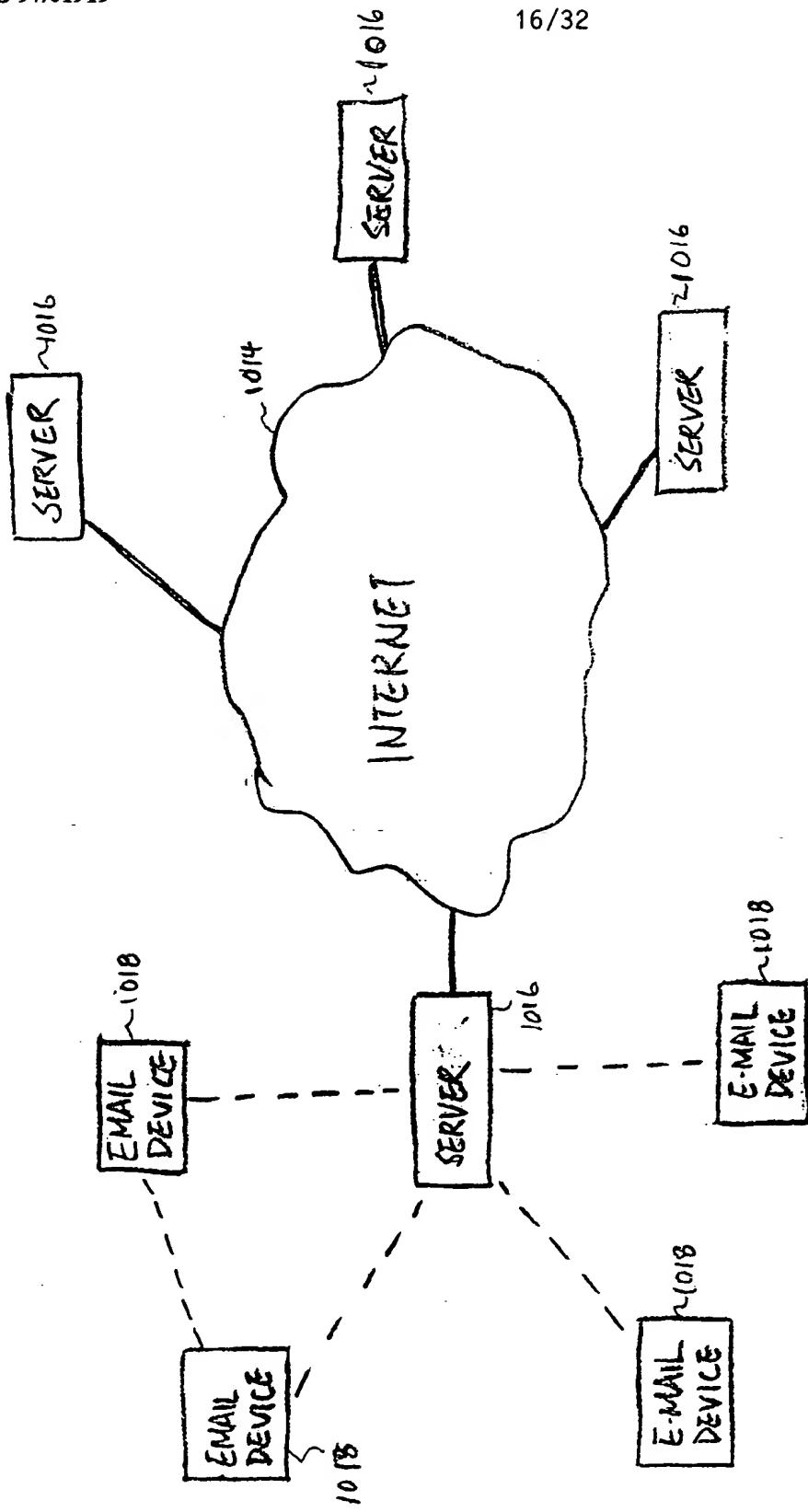


Fig.2

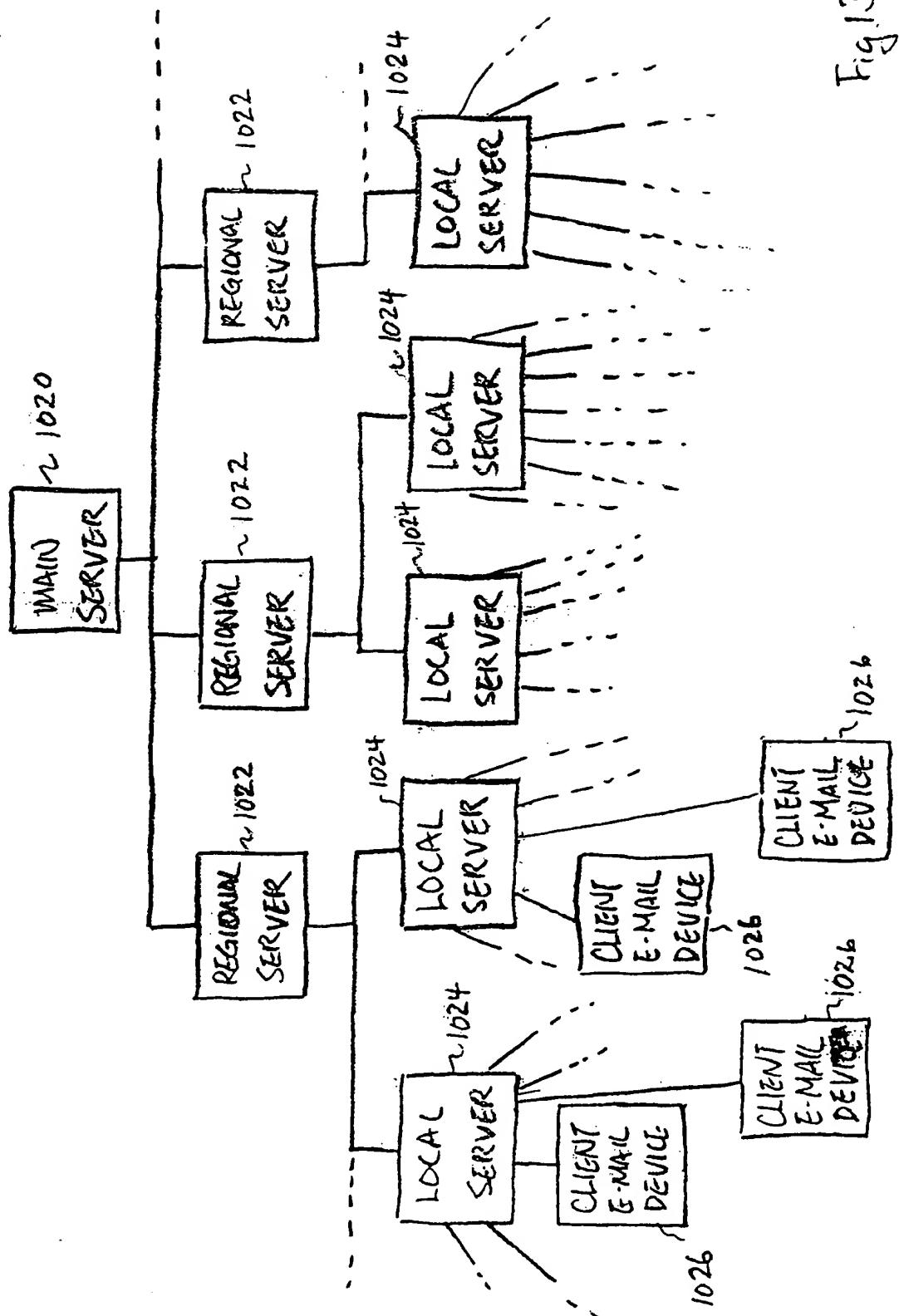


Fig. 13

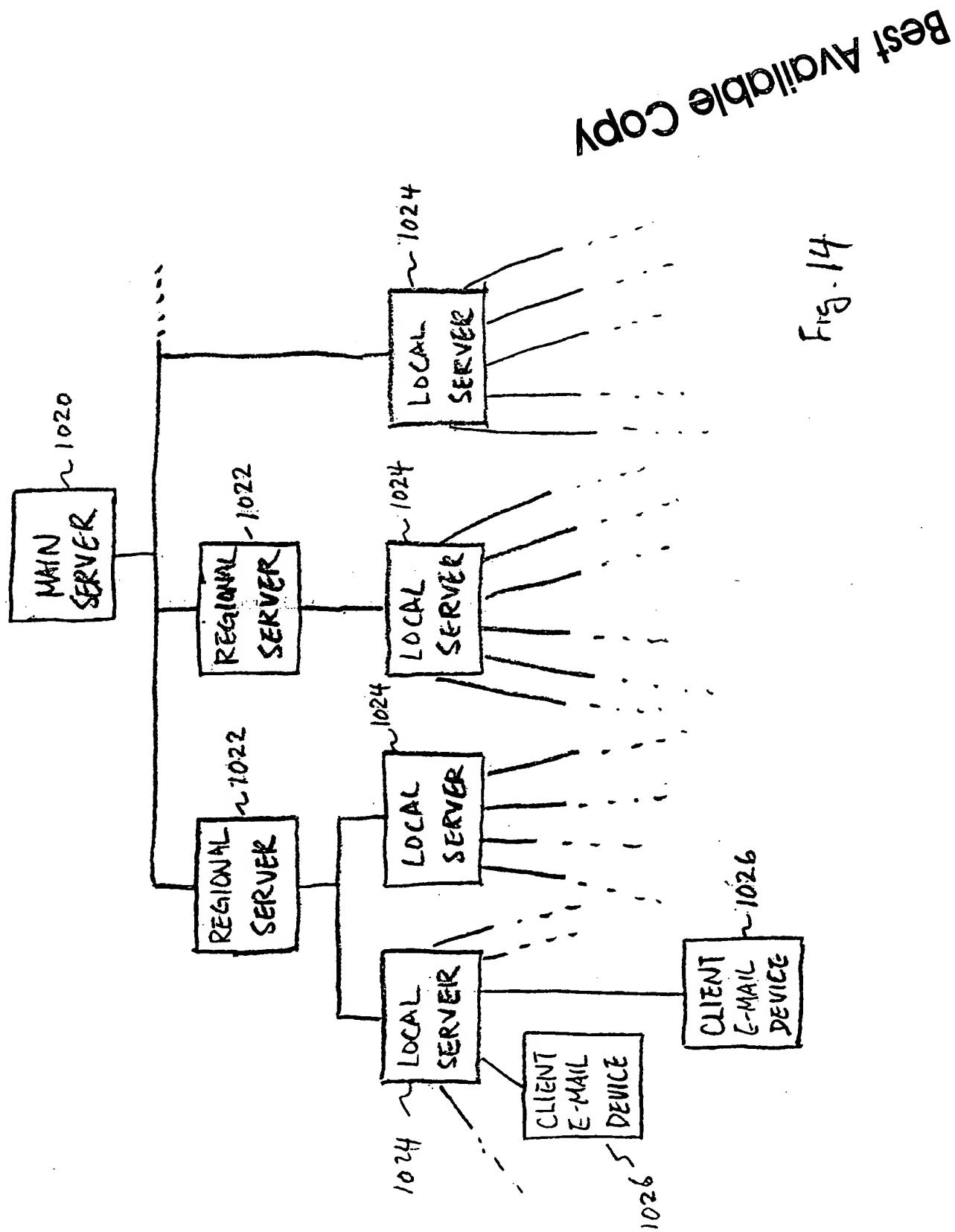


Fig. 14

Fig.15

Registration process:

- get machine id
- get incoming code
- get notification code from e-mail service
- get phone number for e-mail service
- Search for the phone number of the corresponding local server
- Send local server phone number to e-mail device
- Update tables for this client

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Fig.16a

Main Mail Process:

- Every X minutes
- Process - Incoming-Mail
- Process - Outgoing-Mail

Fig.16b

Process - Outgoing-Mail:

- Check for new outgoing mailbag every X minute
- if new outgoing mailbag found,
- for each new outgoing mailbag
  - decompress mailbag
  - extract outgoing mail messages
  - pass outgoing mail messages to sendmail utility

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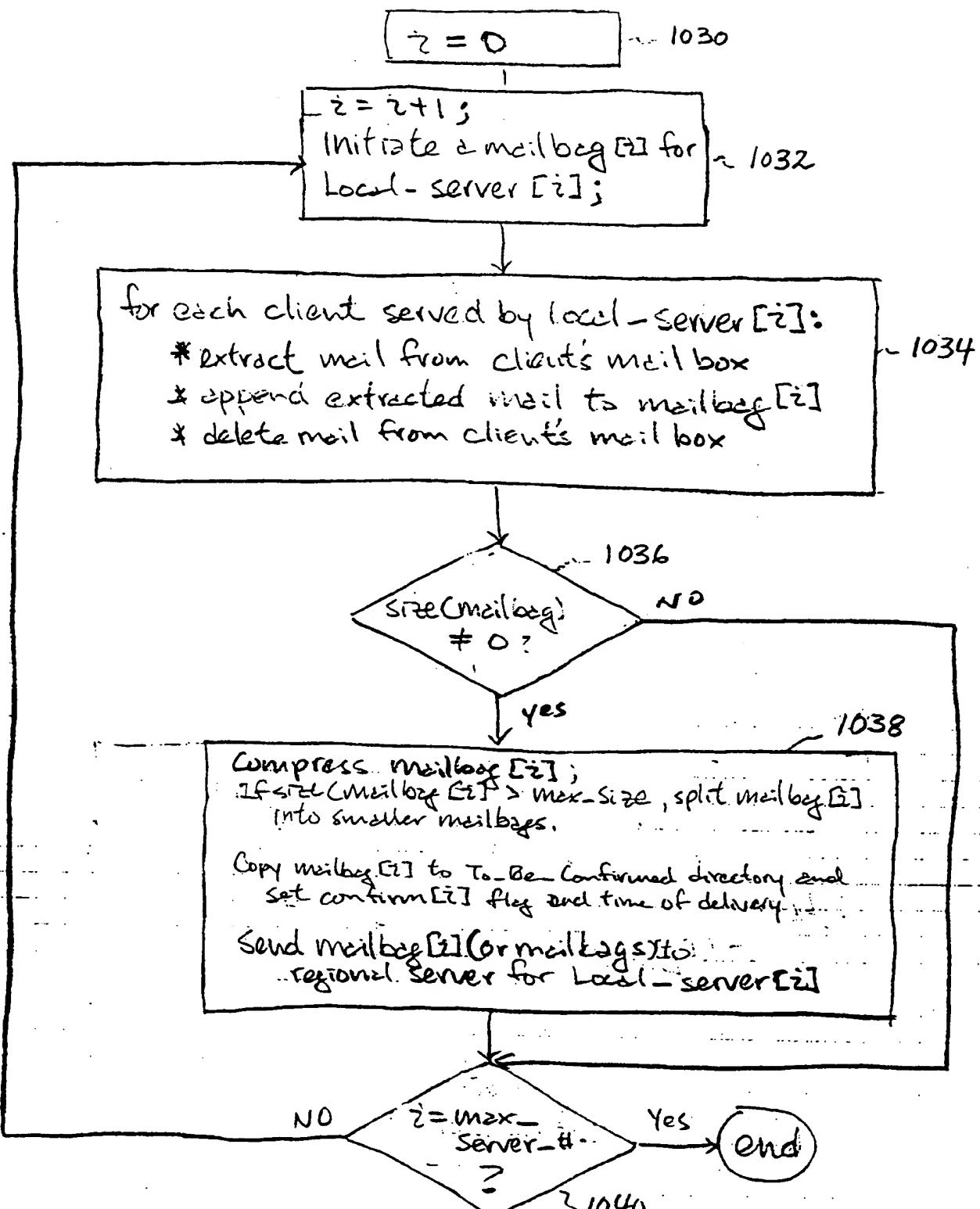


Fig.16c

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(contn)

Every n minutes

for each confirm [i] = true

Search confirmation mail message from local server  
[i];  
If confirmation found

If NOT all mail message in mail bag [i]  
are delivered

If elapse time > max-elapse-time,  
extract and place undelivered  
mail message in delivery-failed  
directory;  
notify operator;

If confirmation not found and  
elapse time > max-elapse time,  
notify operator;

Fig.16d

Best Available Copy

Fig 17a

```

Every x minutes
get mailbox from regional server
decompress mailbox
extract mail messages from mailbox
identify & place mail into recipient clients
m-box

```

Fig 17b

```

Every x minutes
For each Client[i]
  if client[i].m_box is not empty
    Case (Notification Method):
      notify-only:
        notify-process;
      cell-back-mail-delivery:
        Cell-back-mail-delivery;
      Direct-mail-delivery:
        direct-mail-delivery;
    end

```

Fig 17c

```

Notify-process:
Get last-logon-time of Client[i]
Check -new-mail-for-client[i]
if no new mail or if notification has been sent already, exit;
else
  Label 1: Call (Client[i] phone number)
  if busy, wait x minutes and goto Label 1;
  detect-ring-tone for Client[i], x1 second & disconnect;
  wait w1 second;
  Call (Client[i] phone number), if busy, wait x minutes and goto Label 1;
  detect-ring-tone for Client[i], x2 second & disconnect;
  wait w1 second;
  Call (Client[i] phone number), if busy, wait x minutes and go to Label 1;
  detect-ring-tone for Client[i], x3 second and disconnect;

```

**Best Available Copy**

Fig.17d

```

Call-Back-Mail-Server;
try-counter = 0;
Label2: Notify-Process;

Set AutoAnswer for x period of time

If Client Calls back within x period of time
Begin
    Handshake;
    Exchange-Mail-Files;
    Disconnect;
    Send-Confirmation-To-Server;
    Send-Outgoing-Mail-To-Server;
End

Else
    If try-counter > max-trq
        Report error to server
    Else increment try-counter
        goto label2
End

```

Fig.17e

Direct-Mail-Delivery:	
try-counter = 0;	
Label3: Call Client	
If no response from e-mail server increment try-counter	
If try-counter > max-trq report error to server	
Else goto Label3	
End	
Else	
Handshake;	
Exchange-Mail-Files;	
Disconnect;	
Send-Confirmation-To-Server;	
Send-Outgoing-Mail-To-Server;	
End	

Fig 7g

=> change - mail - files:

Retrieve outgoing mail from client e-mail device;

Get available storage size on the e-mail device;

If incoming mail messages > available storage size

Repackage - Mail - Messages;

Send Incoming mail to e-mail device;

Disconnect;

Fig 7h

Repackage - Mail - Messages:

sort incoming Mail in order of Priority

Select Mail in Order of Priority and leave space up to available storage size.

for a system mail message indicating more

mail message at the local server

Fig 7f

Handshaking:

Check security code

If security code incorrect

disconnect;

report unmatched security code to server

ELSE

Check machine ID

If machine ID incorrect

disconnect;

report unmatched machine ID to server

end

Best Available Copy

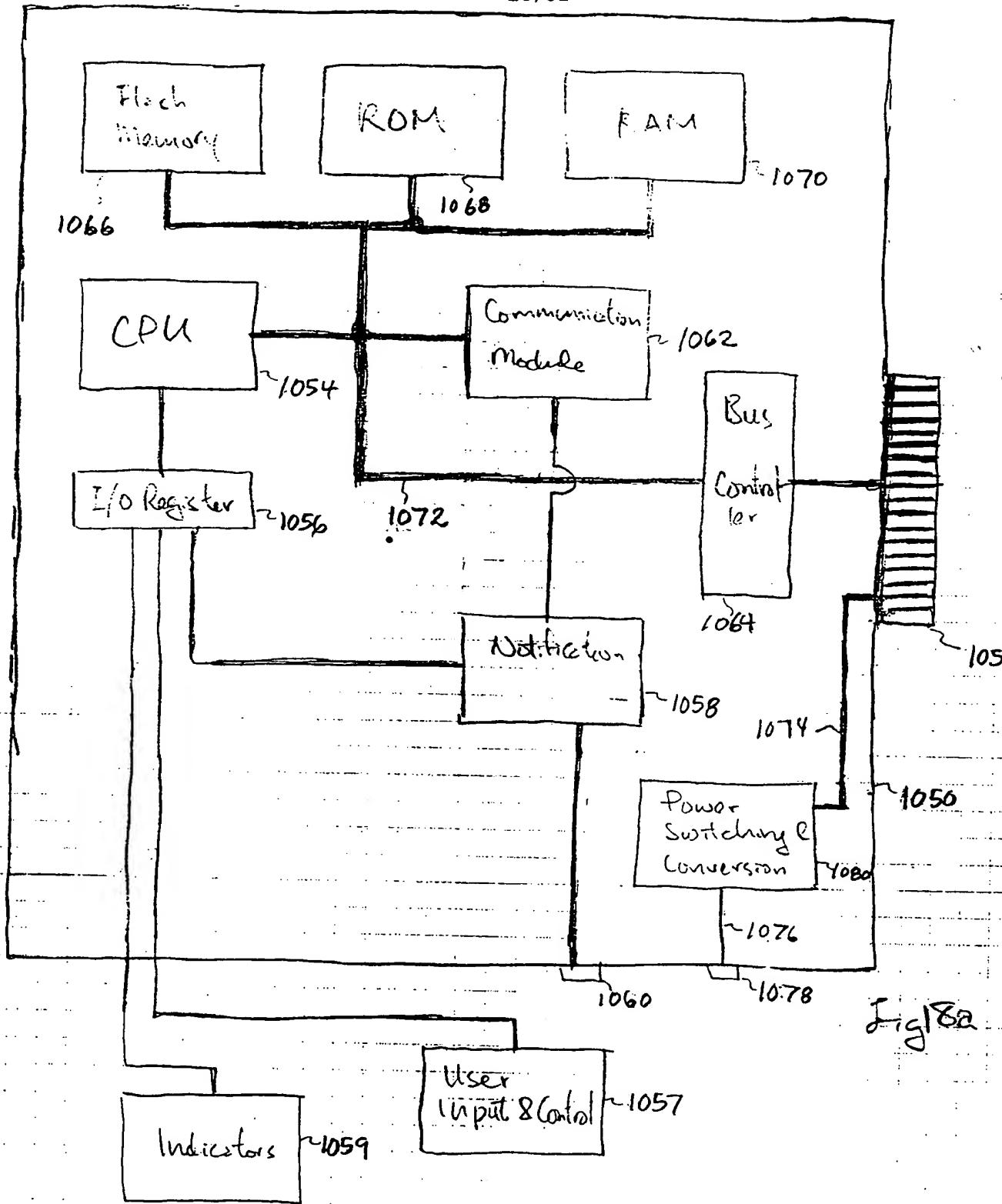


Fig 18a

Fig 18b

```
procedure Get_mail;
    check_card_status
    if busy wait                                // wait until it is not busy
    else
        begin
            check_inmail
            if not empty move the mail to host
            empty the inbox on card
            display_mail
        end
```

Fig 18c

```
procedure Send_mail;
    check_card_status
    if busy wait                                // wait until it is not busy
    else
        begin
            check_outmail_space
            if space available move the mail to card
            done
        end
```

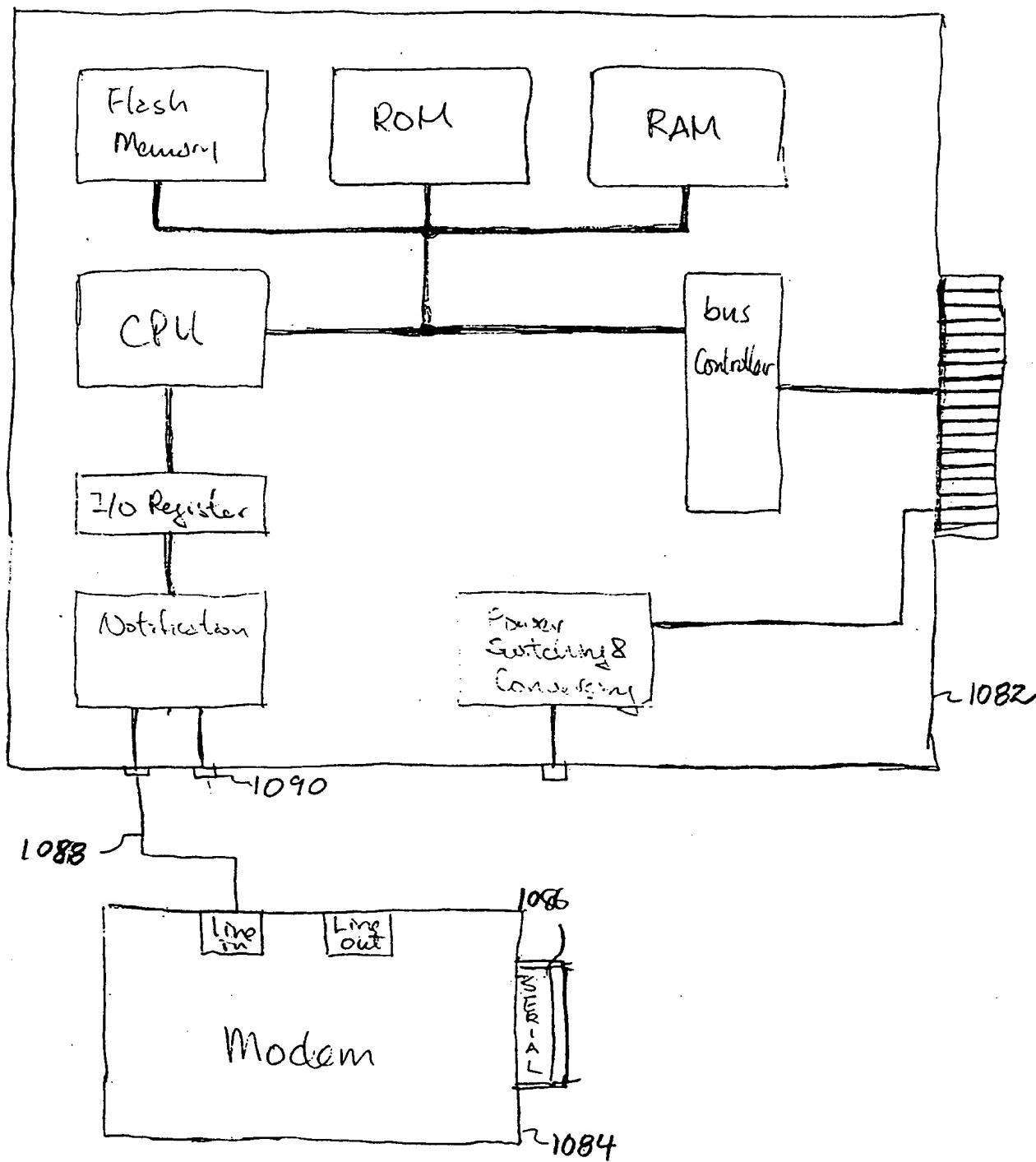


Fig 192

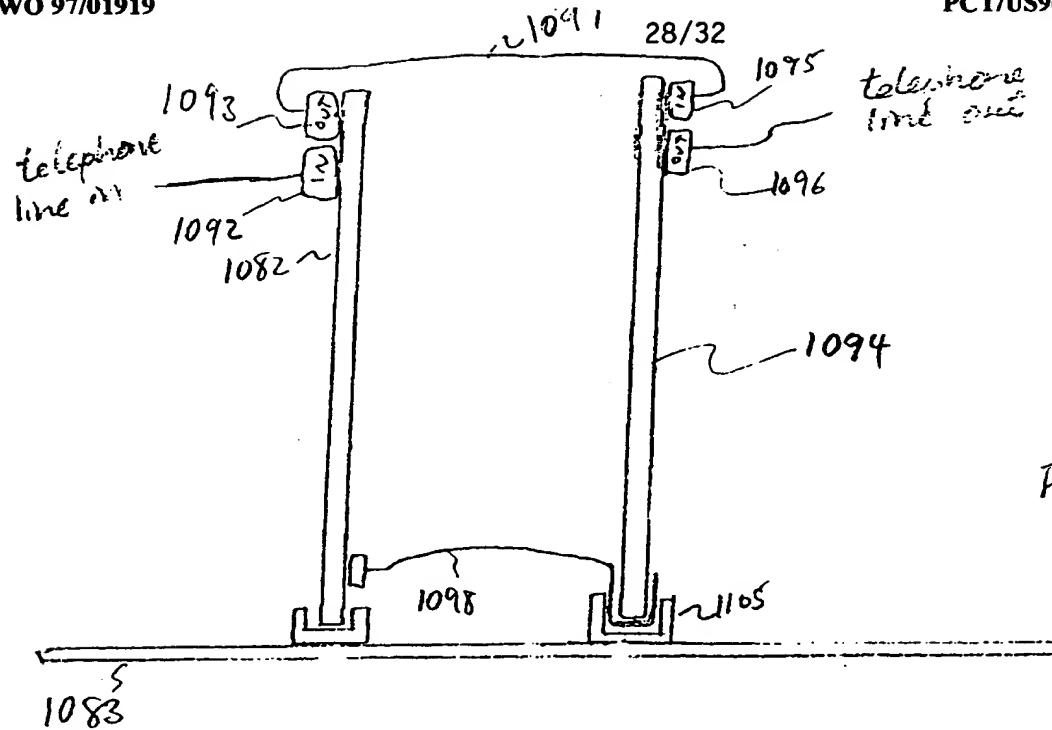


Fig 19b

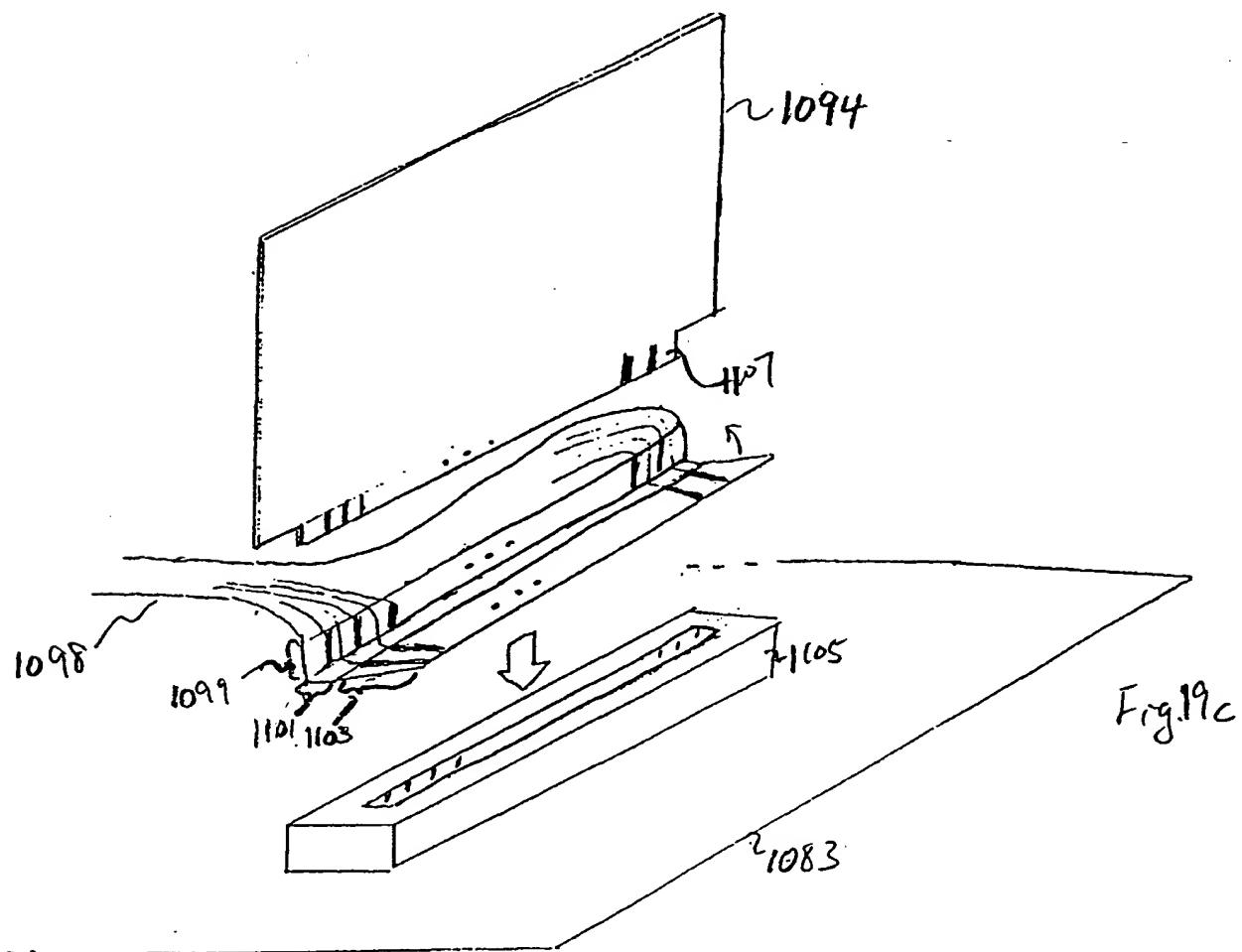


Fig 19c

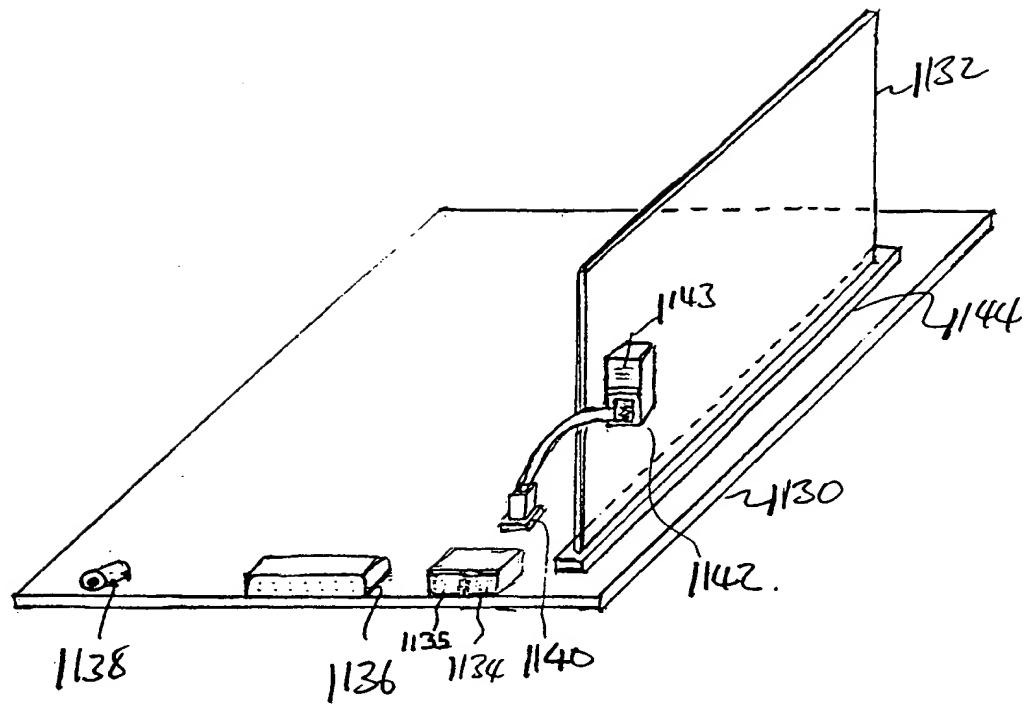


Fig 19d

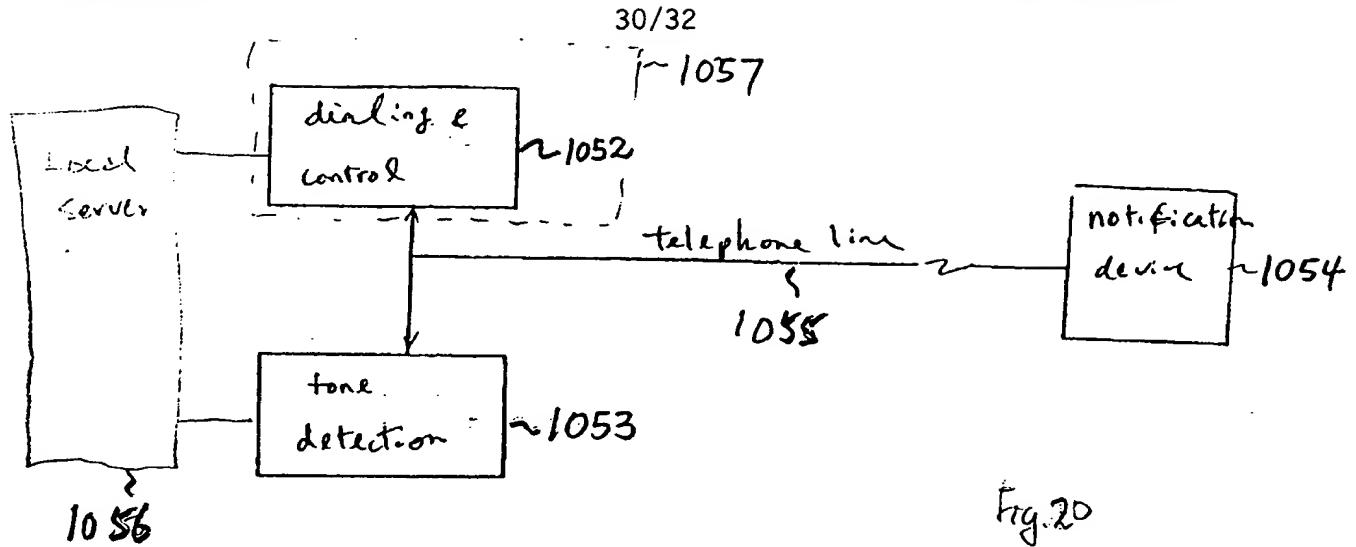


Fig.20

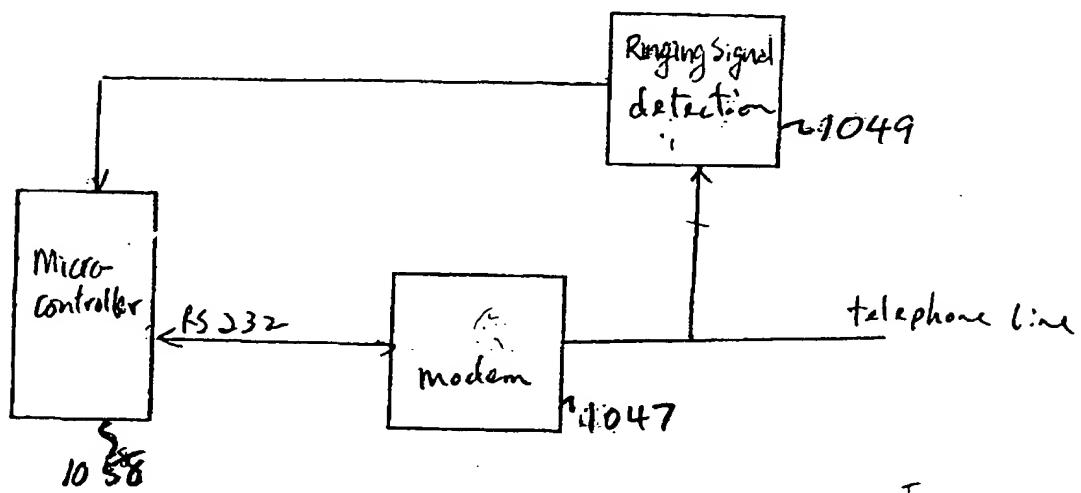


Fig.21

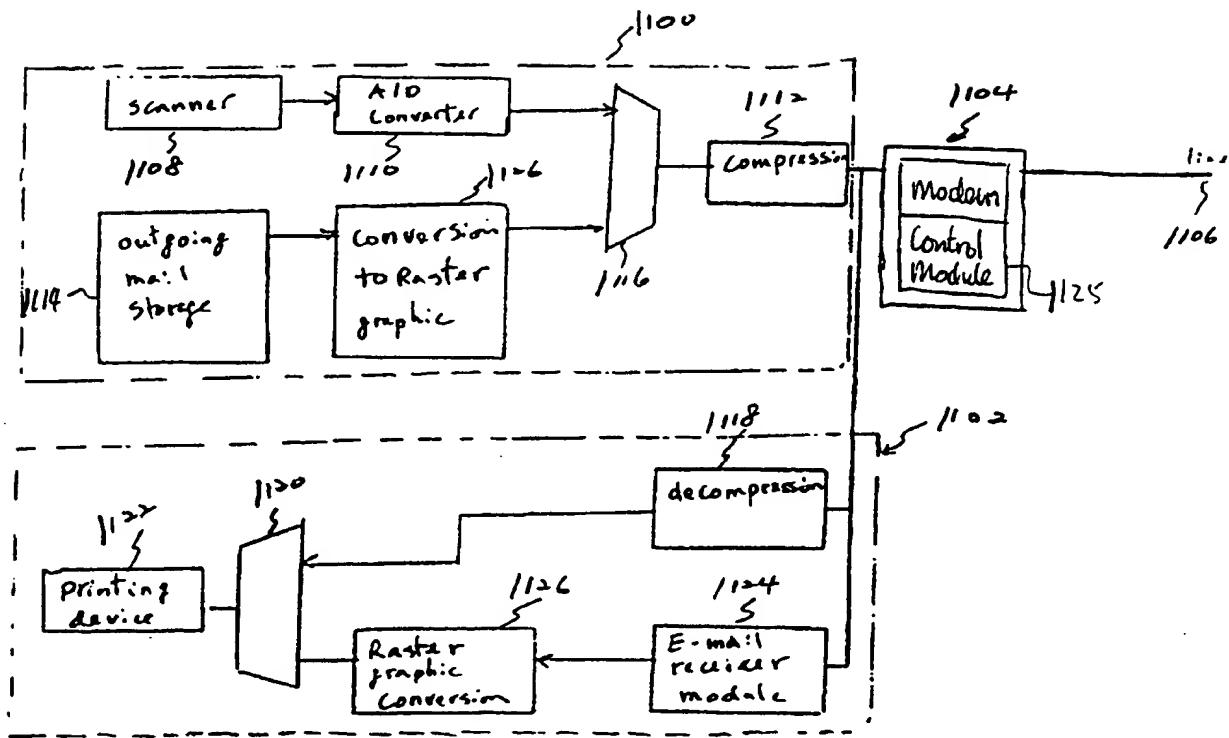


Fig. 22

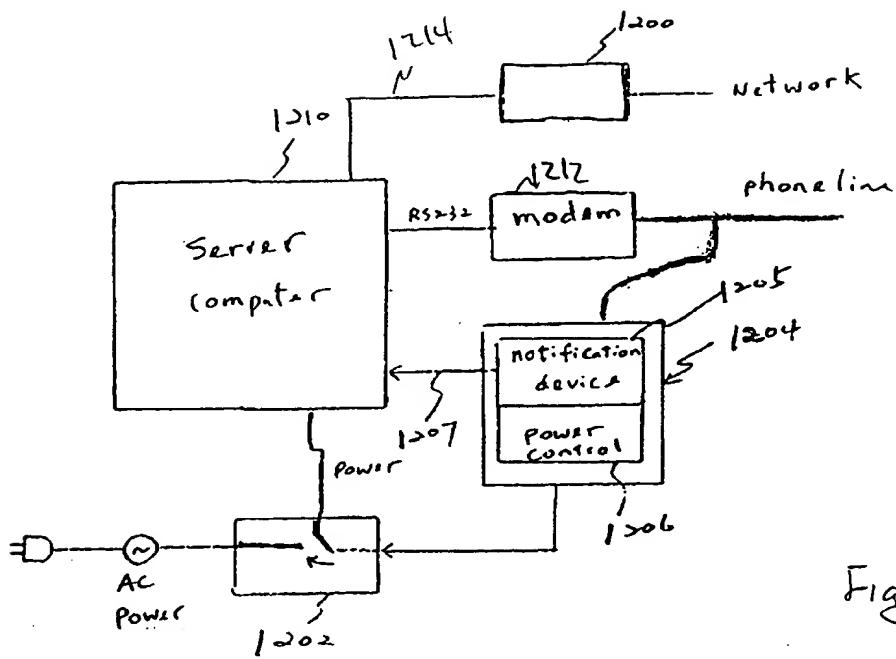


Fig. 23

## INTERNATIONAL SEARCH REPORT

International application No. PCT/US96/11076
---

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04M 11/00  
US CL :379/96

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/96,90,94,97-99,110,67,88,89,142. 348/6,7,14. 370/61.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,837,797 (FREENY, JR.) 06 June 1989, see abstract, all figures.	1-27

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Date of the actual completion of the international search

23 AUGUST 1996

Date of mailing of the international search report

09 SEP 1996

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Authorized officer:  
WING F. CHAN

Telephone No. (703) 305-4750

## INTERNATIONAL SEARCH REPORT

International application No. PCT/US96/11076
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**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04M 11/00

US CL :379/96

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/96,90,94,97-99,110,67,88,89,142. 348/6,7,14. 370/61.

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* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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*L* document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means		
*P* document published prior to the international filing date but later than the priority date claimed		

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Telephone No. (703) 305-4750

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**PCT**

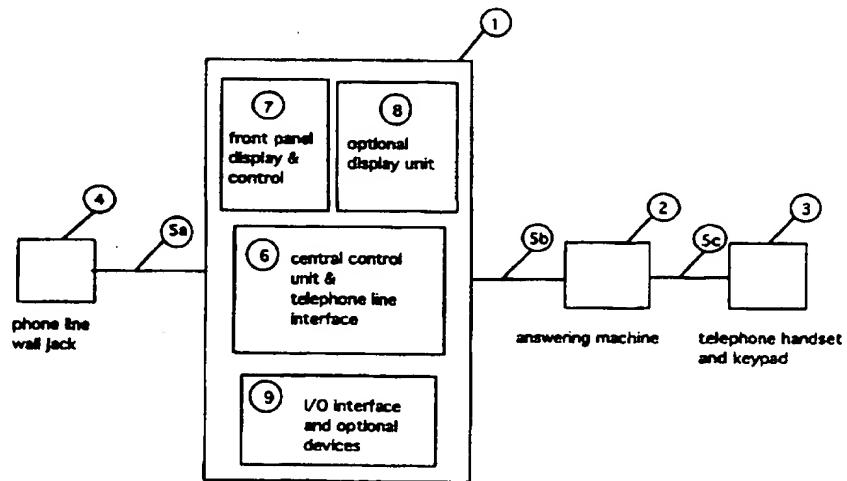
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> :	A1	(11) International Publication Number: <b>WO 97/01919</b>
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(21) International Application Number:	PCT/US96/11076	(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).
(22) International Filing Date:	26 June 1996 (26.06.96)	
(30) Priority Data:		
494,652	26 June 1995 (26.06.95)	US
Not furnished	31 May 1996 (31.05.96)	US
(71)(72) Applicant and Inventor:	WANG, Kevin, Kuan-Pin (US/US); 11867 Woodhill Court, Cupertino, CA 95014 (US).	
(74) Agents:	HAMRICK, Claude, A., S. et al.; Bronson, Bronson & McKinnon L.L.P., Suite 600, Ten Almaden Boulevard, San Jose, CA 95113 (US).	

(54) Title: EVER READY TELEPHONIC ANSWERING MACHINE FOR RECEIVING AND DELIVERING ELECTRONIC MESSAGES



connection of E-mail apparatus and telephone & answering machine

(57) Abstract

The present invention discloses a telephonic E-mail "answering machine" (1) for receiving, processing and storing electronic messages. The E-mail answering machine (1) includes a phone jack (4) for adapting to an existing telephone line for receiving electronic messages from the phone line. The telephonic apparatus further includes a processor (6) for responding to the electronic messages and for storing the messages in the answering machine (1). In another preferred embodiment, the telephonic E-mail answering machine (1) further includes an LCD display (8) for providing information to a user relating to a reception of the electronic messages.

\* (Referred to in PCT Gazette No. 20/1997, Section II)

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GA	Gabon			VN	Viet Nam

1

2 EVER READY TELEPHONIC ANSWERING-MACHINE FOR  
3 RECEIVING AND DELIVERING ELECTRONIC MESSAGES

4

5 BACKGROUND OF THE INVENTION

6

7 Field of the Invention

8 The present invention is generally related to  
9 systems for facilitating electronic messages over  
10 interconnected computer networks, and more particularly,  
11 a system for coordinating and delivering electronic mail  
12 messages directly to a novel device for sending and  
13 receiving electronic mail messages.

14

15 Description of the Prior Art

16 Even with rapid increase in the use of personal  
17 computers and computer networks, the benefits of  
18 electronic communications in the forms of electronic  
19 data (or messages) representing texts, images and sounds  
20 are still limited to very small percentage of the  
21 population. To the majority of people, the information  
22 highway is still too remote. In order to get on the  
23 'ramp' of the information highway, more sophisticated  
24 processes are required which may involve the use of  
25 computer and modem to 'log on' a local server, setting  
26 up an account, executing communications programs,  
27 sending and receiving messages, and download and upload  
28 files. To people in most households, even with a  
29 computer and a modem, these tasks are too complicated and  
30 not sufficiently 'user friendly'. Even if the  
31 technology and the systems are available, there are  
32 still many hurdles to overcome before most people can  
33 switch to an E-Mail communication mode. Ordinary people  
34 are not yet able to take advantage of the existing  
35 telephone systems and micro-processors or computers to  
36 routinely communicate with 'electronic mail' (E-Mail)  
37 for sending and receiving electronic messages.

38 The telephone system has been greatly enhanced and  
39 become a widely accepted communication apparatus in

-2-

1 households and offices since its invention. The examples  
2 include the telephone answering system found in  
3 households, the voice mail system used in office  
4 environments. The telephone answering system, including  
5 a tape recorder and some control circuits, provides a  
6 very affordable and easy-to-use telephone apparatus. It  
7 answers the incoming phone call by taking a series of  
8 steps. It performs an off-hook operation to simulate the  
9 action of human-being picking up a handset Then, it  
10 starts the communication by making an announcement and  
11 takes the message from the caller by recording the  
12 message on an audio tape. when it finishes, it hangs up  
13 and sets the incoming message indicator, such as  
14 blinking a LED. The party being called can look at the  
15 indicator and knows immediately how many messages are on  
16 the machine. To retrieve the message, all it takes is to  
17 push one button. The regular tape recorder functions,  
18 such as STOP, PLAY, FAST FORWARD and REWIND, are  
19 available to the telephone answering system. The system  
20 has been so widely accepted that many manufacturers have  
21 integrated the answering/recording functions within a  
22 telephone apparatus. The voice mail system takes a step  
23 further. It creates individual voice-mail box for  
24 everyone on the list. It allows the sharing of one  
25 telephone answering system but still keeps the privacy  
26 of the individual.

27 While voice communication through the telephone  
28 becomes part of our daily lives, the widely used  
29 computer has created another format of communication-  
30 data communication, One of them is electronic mail, or  
31 E-mail. The electronic mail may contain text, image and  
32 digitized voice It provides a great alternative of  
33 communication among people. Through computer network  
34 system, one person can send a mail to another person  
35 anywhere in the world as long as the addressee has a  
36 computer connected to the same network The increasing  
37 popularity of the global computer network the Internet,  
38 has made the E-mail more useful than ever.

39 These two important ways of communication by the

- 3 -

1      use of telephone and computer networks have worked very  
2      well in voice and data communication respectively. More  
3      sophisticate computer users are able to use computer  
4      with modem to conned with existing telephone networks to  
5      manage both data and voice communication. However, since  
6      the telephone lines can only be used on a 'dedicated'  
7      basis. Voice or data communication is totally blocked  
8      for a segment of time when that line is occupied in  
9      connecting by modem to computer networks or when two  
10     people are talking using' the phone. Because of the  
11     nature of operation, an electronic message, which has  
12     arrived at a server station, has to wait until a user  
13     logs on thus much useful time is wasted. This passive  
14     nature of E-mail delivery thus generates waste of useful  
15     resources and time when the messages are idle waiting to  
16     be retrieved.

17       There are some attempts to integrate a plurality of  
18       media communication in office environment Some  
19       representative examples are U.S. Pat No.5,333,266,  
20       entitled METHOD AND APPARATUS FOR MESSAGE HANDLING IN  
21       COMPUTER SYSTEMS, issued to Boaz et al. on Jul.26, 1994  
22       and U.S. Pat No. 5,349,636, entitled INTERFACE SYSTEM  
23       AND METHOD FOR INTERCONNECTING A VOICE MESSAGE SYSTEM  
24       AND AN INTERACTIVE VOICE RESPONSE SYSTEM, issued to  
25       Irribarren on Sept.20, 1994. Both rely on a powerful  
26       computer and a local area network to integrate multiple  
27       message systems. They were designed for office use not  
28       suitable for households or small offices. Another  
29       example is U.S. Pat 5,193,110, entitled INTEGRATED  
30       SERVICES PLATFORM FOR TELEPHONE COMMUNICATION SYSTEM. It  
31       is specifically designed for use in the central office  
32       of telephone company or in a large corporate office.  
33       These inventions do not provide a solution to the  
34       difficulties that higher skill level of computer are  
35       required for E-Mail communication, Regular daily use of  
36       E-Mail communication in homes, college dormitories and  
37       small offices are still not so convenient for most  
38       people.

39       Popular and routine use of E-Mail communications

1 are still hindered by current requirements of equipment  
2 and network configurations. First, the E-mail is limited  
3 to those who have access to computers or terminal  
4 devices connected to a host computer capable of process  
5 E-mail. This may not be a problem in modem offices  
6 equipped with computers and networks for connecting to  
7 host computers or network servers. But it becomes a  
8 significant limiting factor for households and offices  
9 without the modem equipment or connecting networks.  
10 Secondly, the actual reception of the electronic  
11 messages can only be performed when the receiving  
12 computers, i.e., terminals for communication, are  
13 connected to E-mail server. The usefulness of E-mail is  
14 greatly limited in terms of timelines of the messages.  
15 In order to assure that no important messages are  
16 missed, a user has to log on to the network in a routine  
17 manner to 'check the mail' regularly. It may becomes  
18 burdensome during some inconvenient time. In order to  
19 resolve this difficulty, Clercq discloses in a U.S. Pat  
20 5,138,653, entitled SYSTEM FOR AUTOMATIC NOTIFICATION OF  
21 THE RECEIPT OF MESSAGES IN AN ELECTRONIC MAIL SYSTEM  
22 (issued on Aug. 11 1992), an E-mail system for making a  
23 call to an E-mail addressee which is triggered when a  
24 message is received. An addressee is then required to  
25 retrieve the E-mail from remote station by the use of a  
26 computer. It may even be more inconvenient than a  
27 beeper' as the addressee may not be in a convenient  
28 place with access to a computer and modem to log on to a  
29 server.

30 Therefore, a need still exists in the art of system  
31 design and device manufacture for electronic message  
32 communication to overcome these bottlenecks and  
33 inconveniences which limit the usefulness of the E-mail.  
34 Specifically, it is desirable to provide a telephonic E-  
35 mail apparatus which provides functions similar to a  
36 phone answering machine which is ready for a user for  
37 receiving, viewing or listening to the received  
38 electronic messages in a 'plug and play' fashion.  
39 Additionally, in order to minimize any inconvenience

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1 thus caused to a user, it is desirable to adapt the  
2 telephonic E-mail apparatus without interfering existing  
3 telephonic communication operations. A user would thus  
4 be allowed to operate a telephone or phone answering  
5 machine with the E-mail apparatus as if no E-mail  
6 apparatus had been adapted into the system. An ordinary  
7 telephone user would then be provided with a convenient  
8 E-mail apparatus ready to be adapted into a telephone  
9 system without requiring the use of a computer and  
10 applying computer skills whereby the limitations and  
11 difficulties of the prior art can be resolved.

12 Moreover, as more and more people have access to  
13 computers providing for electronic mail messaging  
14 capabilities via the internet or internal networks,  
15 electronic mail messages, commonly referred to as e-mail  
16 messages, are becoming an integral part of modern  
17 communication. The delivery of an e-mail message occurs  
18 virtually instantaneously and the recipient of an e-mail  
19 message can reply to the message within minutes of the  
20 receipt.

21 However, for the situation where a user is  
22 connected via a phone line to the network, special  
23 problems exist. In this scenario, e-mail communication  
24 requires certain hardware and software combination in  
25 order for the user to send and receive e-mail messages.

26 Generally speaking, for connection to the internet via a  
27 phone line to a network server, the necessary hardware  
28 includes a computer and a communication device such as a  
29 modem. Software wise, a mail program for the sending  
30 and receiving of e-mail messages is needed.

31 Additionally, there may be a monthly subscriber charge  
32 for connect time to the server imposed by a internet  
33 service provider if the user is not connected via a  
34 prepaid network. Overall, economically speaking, it can  
35 be a significant investment to have a computer set up  
36 for the sending and receiving of e-mail messages.

37 Moreover, the necessary hardware and software are fairly  
38 complex and may be difficult to set up by a novice user.  
39 These barriers bar majority of people from communicating

-6-

1       with e-mail messages.

2           Even if a user has a complete computer system setup  
3       for the sending and receiving of e-mail messages, there  
4       are problems with receiving the messages in a timely  
5       manner, with power consumption, and with security risks.

6           In order to receive e-mail messages in a timely  
7       manner, a user must either manually and periodically  
8       dial into a network server or program the computer to  
9       automatically and periodically dial into the server to  
10      check and retrieve new mail messages. The manual method  
11      is a time consuming and tedious process that distracts  
12      the user from productive use of his or her time. The  
13      automatic method requires that the computer be left on  
14      all of the time which wastes power and may incur  
15      telephone toll charges every time the computer calls the  
16      server. If the network server is programmed to call and  
17      deliver a new message to the user's computer upon  
18      receiving it, the user's computer must be left on all  
19      the time which again wastes power.

20          Moreover, whenever a computer is left on, there is  
21      a risk of security breach where there might be  
22      unauthorized access to the computer via either the phone  
23      line or from the keyboard by an unauthorized person and  
24      thereby compromising the user's computer system.

25          All in all, the above described factors prevents e-  
26      mail messages from being delivered to every household.  
27          Thus, a new e-mail system and a low cost device are  
28      needed to provide an universal e-mail messaging system  
29      capable of sending and receiving e-mail messages from  
30      and to every household.

31

#### 32                   SUMMARY OF THE PRESENT INVENTION

33          It is therefore an object of the present invention  
34      to provide an apparatus and a new communication system  
35      architect and process ready for implementation on  
36      existing telephone system to overcome the aforementioned  
37      difficulties encountered in the prior art.

38          Specifically, it is an object of the present  
39      invention to provide an apparatus ready to adapt to an

1 existing telephone system in a 'plug-and-play' manner to  
2 receive and delivery electronic messages including text,  
3 images, and digitized voice signals whereby every  
4 household with a telephone can easily access to and be  
5 benefited by electronic messages without requiring more  
6 complicate processes of employing computer and modem and  
7 managing the execution of communication programs before  
8 such messages can be exchanged thereon.

9 Another object of the present invention is to  
10 provide a telephonic electronic message 'answering  
11 machine' which is equipped with user friendly features  
12 similar to a convention answering machine without  
13 interfering with existing telephone functions such that  
14 every regular house can apply such an apparatus  
15 immediately.

16 Another object of the present invention is to  
17 provide an electronic message apparatus which stores  
18 initial registration and subsequent logon information  
19 therein to automatically dial up several local servers  
20 directly, subject to user selection, to perform the  
21 initial registration and subsequent logon functions such  
22 that more complex functions of registration and logging  
23 on to a server can be managed automatically.

24 Another object of the present invention is to  
25 provide an electronic message apparatus which can  
26 coordinate with a server to perform message screening  
27 and message prioritizing functions such that a user can  
28 pre-arrange to receive or screen types of messages  
29 according to the importance of such messages.

30 Yet another object of the present invention is to  
31 provide a method and apparatus for facilitating,  
32 sending, and receiving of e-mail messages through  
33 interconnected computer networks or telephone networks.

34 A further object of the present invention is to  
35 provide a low cost method and apparatus for transmitting  
36 and receiving e-mail messages.

37 Yet another object of the present invention is to  
38 provide a low cost method and apparatus for delivering  
39 e-mail messages incurring minimum telephone toll

1       charges.

2           Briefly, in a preferred embodiment, the present  
3       invention includes a telephonic apparatus for processing  
4       electronic messages which includes a means for adapting  
5       to an existing telephone line for receiving electronic  
6       messages including digitized signals. The telephonic  
7       apparatus further includes a processing means for  
8       responding to the electronic messages and for storing  
9       the messages therein. In another preferred embodiment,  
10      the telephonic apparatus further includes an user  
11      interface means for providing information to an user  
12      relating to a reception of the electronic messages.

13       In another embodiment, a system for facilitating,  
14      sending and receiving e-mail messages is disclosed.  
15      This e-mail system is supported by one or more main  
16      servers and a plurality of regional servers  
17      geographically distributed in populated areas, and are  
18      interconnected via a computer network such as the  
19      internet. An incoming e-mail message under this system  
20      is first processed and packaged by the main server to  
21      allow tracking of this message. The packaged message is  
22      then sent to the designated local server via a regional  
23      server. The local server receives the e-mail message  
24      and notifies or delivers the message to a client (user)  
25      e-mail device through one of several available methods.  
26      These methods include direct mail delivery, call-back  
27      mail delivery, and notify-only. Under the notify-only  
28      method, the local server uses an optional ringing  
29      protocol to notify the e-mail device that there is a  
30      mail message waiting. Under the call-back delivery  
31      method, the local server uses the optional ringing  
32      protocol to notify the e-mail device, and the e-mail  
33      device then calls the local server to retrieve the  
34      message. Under the direct-delivery method, the local  
35      server calls the e-mail device and delivers the message.  
36      The e-mail device is a novel device designed to send and  
37      receive e-mail messages. It is a low cost device that  
38      may be a stand-alone device, a part of a multi-function  
39      device, or a part of a computer expansion card. The

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1 servers of the present invention can be maintained and  
2 operated remotely.

3 An advantage of the present invention is that it  
4 provides a method and apparatus for facilitating,  
5 sending, and receiving e-mail messages through  
6 interconnected computer networks and/or telephone  
7 networks.

8 Another advantage of the present invention is that  
9 it provides a low cost method and apparatus for  
10 transmitting and receiving e-mail messages.

11 Yet another advantage of the present invention is  
12 that it provides a low cost method and apparatus for  
13 delivering e-mail messages while minimizing telephone  
14 toll charges.

15 These and other objects and advantages of the  
16 present invention will no doubt become obvious to those  
17 of ordinary skill in the art after having read the  
18 following detailed description of the preferred  
19 embodiments.

20

21 **BRIEF DESCRIPTION OF THE DRAWINGS**

22 Fig. 1 is a diagram showing how the present  
23 invention of the E-mail apparatus connects with the  
24 existing telephone answering system.

25 Fig. 2 is a block diagram of the present invention  
26 of E-mail capable telephone apparatus.

27 Figs. 2a, 2b, 2c, 2d are preferred embodiments of  
28 communication systems which incorporate an E-mail  
29 apparatus of the present invention.

30 Fig. 4 is an implementation example of a basic  
31 front control panel of the apparatus.

32 Fig. 5 is an example of more complicated or non-  
33 frequently used functions menu of the apparatus.

34 Fig. 6 is a flow diagram of the easy registration  
35 process.

36 25

37 Fig. 7 is a flow diagram of a typical E-mail  
38 collecting process.

39 Fig. 8 is a flow diagram of an E-mail receiving

1 process.

2 Fig. 9 is a flow diagram of the E-mail delivery  
3 process on the E-mail sever.

4 Fig. 10 is the overall network connection diagram.  
5 It shows how the E-mail ready telephone communicates  
6 with the server and the rest of the world.

7 Fig. 11 illustrates a conceptual representation of  
8 the internet, a number of servers connected to the  
9 internet, and a number of computers connected to each  
10 server;

11 Fig. 12 illustrates a conceptual representation of  
12 the e-mail system of the present invention utilizing the  
13 internet, servers, and e-mail devices;

14 Fig. 13 shows a hierachial relationship between  
15 the main server, regional servers, and local servers;

16 Fig. 14 shows another hierachial relationship  
17 between the main server, regional servers, and local  
18 servers where the local servers may be connected  
19 directly to the main server;

20 Fig. 15 illustrates the steps for registering an e-  
21 mail device;

22 Figs. 16a-16d show the pseudo code for the  
23 procedures residing on the main server for facilitating  
24 incoming and outgoing e-mail messages;

25 Figs 17a-17h show the pseudo code for the  
26 procedures residing on the local server for interacting  
27 with the main server and the e-mail device;

28 Fig. 18a shows a computer expansion card  
29 implementation of the e-mail device;

30 Fig. 18b-18c illustrate the pseudo-code for the  
31 software residing on the computer system for operating  
32 the e-mail expansion card;

33 Fig. 19a-19d show other computer expansion card  
34 implementations of the e-mail device used in conjunction  
35 with a fax/modem;

36 Fig. 20 illustrates a block diagram of the  
37 components in implementing the ringing protocol on the  
38 local server side;

39 Fig. 21 illustrates a block diagram of the

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1 components in implementing the ringing protocol on the  
2 e-mail device side; and

3 Fig. 22 illustrates a block diagram of an  
4 integration of a faxing device and the e-mail device.

5 Fig. 23 illustrates a configuration for remote-  
6 controlling a server computer using the ringing protocol  
7 of the present invention.

8

9 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

10 Referring to Fig. 1, the block diagram shows how  
11 the present invention of the E-mail apparatus connects  
12 to the telephone and the answering system. A twisted-  
13 pair of telephone line 5a connects the phone jack 4 on  
14 the wall to the "line" connector on the E-mail apparatus  
15 1. Another telephone wire 6 connects the "phone"  
16 connector on apparatus 1 to the answering system 2. Then  
17 the answering system 2 connects to the telephone  
18 (handset and keypad) through line 5c. if there is no  
19 answering machine, line 5b connects to the telephone  
20 directly. Every incoming phone call will be taken by the  
21 E-mail apparatus first. If it is not for E-mail, it will  
22 pass the call to the answering system. It is important  
23 to maintain the same functionality of the existing  
24 telephone answering system when the apparatus is added  
25 to the telephone/answering system. It will be clear when  
26 we explain the inside of the apparatus 1. In Fig 1. it  
27 shows that the apparatus has 4 major building blocks:  
28 central control & telephone line interface unit 6, front  
29 panel display and control 7, optional display unit 8,  
30 I/O interface and other devices 9. Only the central  
31 control & telephone line interface unit 6 is needed for  
32 every apparatus. The others may have many different  
33 combinations.

34 Fig. 2 is the internal detailed diagram of the E-  
35 mail apparatus. Processor 11 reads the codes stored in  
36 ROM 12 and performs its duty according to the request  
37 from the user. For example, if the auto-collect is set  
38 up, processor 11 will receive an interrupt signal from  
39 interrupt controller 17. The interrupt will be serviced

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1 by processor 11 to set up modem 23 through universal I/O  
2 bus 20 and dial the designated E-mail server to collect  
3 the E-mail. By using an universal I/O bus 20, it makes  
4 the architecture flexible to add or reduce its  
5 functions. Block 14 contains logic to interface system  
6 bus and I/O bus. Blocks 11-20 constitute the basic  
7 central control unit Blocks 21-23 belong to the  
8 telephone interface unit The basic control and display  
9 unit has blocks 25 and 26. Block 28 is the display for  
10 mail reading and block 27 is the controller for block  
11 28. There are two displays in Fig. 2 The small display  
12 in 26 is used for control and status information. To  
13 display mail, a bigger display 28 is more suitable. If  
14 display 28 is built-in, display 26 can be eliminated. If  
15 the user relies on data export function to move E-mail  
16 files to his computer and to read the mail there,  
17 display 26 alone will be enough. Display 28 can be a  
18 LCD, monitor or a TV, and display control 27 will be a  
19 compatible controller. RAM 12 is a device used as a  
20 scratch pad for processor during the execution of the  
21 codes from ROM 12 ROM 12 can be a flash memory.  
22 Processor 11, ROM 12, RAM 13 and I/O bus controller 14  
23 are connected to system bus 15. I/O bus controller  
24 allows the processor to communicate with all the other  
25 I/O devices. Real time dock 19 keeps track of the time.  
26 Timer 18 and interrupt controller 17 are used for  
27 program flow control. Clock and power management 16 is  
28 used to save the power consumption of the apparatus.  
29 when power consumption is not a concern, block 16 can be  
30 as simple as a dock chip. Processor 11 responds to the  
31 user request from front panel control 26 through panel  
32 interface block 25. It also uses panel interface block  
33 25 to display other information to user. UART 22 is a  
34 serial communication block, it is used to move data  
35 between the E-mail apparatus and the external world.  
36 Through the modem and telephone line, it connects the  
37 apparatus to other communication devices. With a local  
38 Rs-232 or infra-red link, it can import/export data  
39 to/from a computer, digital organizer or printer.

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1      Display control 27 is to display the mail on a display  
2      device 28. Some desirable devices such as secondary  
3      storage device 21, audio device 29 are optional add-ons.  
4      If a reasonable size of flash device is used as storage,  
5      block 21 will not be important Telephone interface block  
6      24 controls the interface with telephone line, telephone  
7      answering system and modem. The details of block 14 are  
8      shown in the diagram of Fig 3.

9      There are many electronics devices available to  
10     implement Fig 2. Here is one example. Use the single  
11     chip platform VG-230 from Vadem (San Jose, California)  
12     for blocks 11, 15, 16-19, 20, 22, 27 in Fig. 2. This  
13     chip has processor, memory controller, I/O bus and many  
14     I/O peripheral devices integrated into a single chip.  
15     Modem (block 23) can be the single-chip modem SSI  
16     73K321L from Silicon Systems (Tustin, California).

17     Figs. 2a - 2d are preferred embodiments showing  
18     some of the possible combinations of the modules. Fig.  
19     2a uses TV as a primary display of mail. Block 28 in  
20     Fig. 2 is replaced with a television 28a. Flash memory  
21     12a is used for codes and mail storage space. This is  
22     one of the simple implementations. Fig. 2b is suitable  
23     for people who have access to the computer. It is  
24     comprised of a floppy controller and drive. The mail is  
25     save on a floppy diskette. The user can take diskette to  
26     a computer and read mail there. Block 25 can be  
27     simplified since there is no need to control the display  
28     of mail. This is an example of how to count on data  
29     export function to reduce the configuration of the  
30     apparatus. Fig. 2c is another example of data export  
31     function except using different means of moving data is  
32     used. It uses Infra-red link o move data to/from the  
33     computer. In both cases, outgoing mail can also be  
34     imported from diskette or infra-red-link. Fig. 2d is an  
35     example with extensive functions. It contains removable  
36     flash memory card 26b using industry standard PCMCIA  
37     interface to save mail. It has a built-in LCD display  
38     28b for reading mail. An audio device 29a will generate  
39     voice if the incoming mail contains a digitized voice

1 file.

2 Fig. 3 is the diagram showing internal block of the  
3 telephone interface function. When the system is in idle  
4 state (i.e. no incoming phone call), line switch 31 is  
5 set to telephone line 35 and interface control 34 and  
6 line 39 is open. When there is an incoming phone call,  
7 the telephone line interface control 34 will generate an  
8 off-hook to the caller and then monitor line 35 to see  
9 if it is an E-mail communication from line 38. If it is  
10 not, interface control 34 triggers a ring through the  
11 ring control 32 and lines 40, 41 and 42 to the telephone  
12 answering system. When handset/keypad interface block 33  
13 detects off-hook signals on line 37 from the telephone  
14 answering system, line switch 31 turns the switch to  
15 line 39. Then the telephone is in control. The E-mail  
16 apparatus gives up communication to the  
17 telephone/answering system. This is a very important  
18 process for maintaining the function of telephone  
19 answering system function as if the E-mail apparatus is  
20 absent. In the case of E-mail communication, line switch  
21 31 keeps the phone line connected to 35 all the time.  
22 Handset and keypad interface block 33 also becomes  
23 active when the keypad is used to control the E-mail  
24 apparatus or to edit an outgoing mail. The keypad  
25 information will be passed to the processor to respond.

26 Fig. 4 is an example to show the concept of the  
27 easy-to-use interface. Block 51 is a simple display  
28 panel. Blocks 52-57 are control buttons. Button 58 is a  
29 control button and an indicator. A blinking indicator 58  
30 means an incoming mail is ready for retrieval. The user  
31 can push button 54 to read the mail. At every push of  
32 button 54, a full page of mail would be displayed to fit  
33 into the size of the display. Push button 55 to jump to  
34 the next mail. Button 53 is to display the previous  
35 page. Pushing button 52 to jump to the beginning of the  
36 previous mail. Pushing button 52 longer means back  
37 to the beginning of the first mail and the mail will be  
38 overwritten when the next batch of mail arrives. Pushing  
39 button 58 will dial, send and collect mail. When it is

1 done, a message will be displayed on block 1 and call  
2 indicator 8 will be blinking. Button 56 is used to  
3 interrupt the E-mail communication when the user needs  
4 to use the telephone. Button 57 is a special function  
5 button. It provides more complicated or unusual  
6 functions. It brings a menu of functions for the user to  
7 select. The functions may include registration, mail  
8 forward, and mail hold request. The list in Fig. 5 is an  
9 example for those functions. The concept of separating  
10 all the basic and frequently-used functions from the  
11 complicated and infrequently-used functions by different  
12 interfaces makes the E-mail apparatus a user-friendly  
13 device while maintaining some advanced functions.

14 Fig. 5 exemplifies a list of the menu of more  
15 complicated and infrequently-used functions. Function 1  
16 is a guided registration process function. Function 2 is  
17 to set the current time. Function 3 is to set the  
18 programmable secret code. Function 4 is to change the  
19 number to dial other than the designated E-mail server.  
20 Function 5 is to request E-mail server to hold the mail.  
21 Function 6 is to request the forwarding of the mail.  
22 Function 7 is to set up the daily auto-dial and connect  
23 time with the E-mail server. Function 8 is for data  
24 import/export. Function 9 is to display your e-mail  
25 address. Function 10 is to request the change of E-mail  
26 address if you don't like the assigned address after  
27 registration. Function 11 is to run diagnostics on the  
28 unit. By pushing button 57 in Fig. 5, the menu of  
29 functions will be on the display 51 in Fig. 4. Every  
30 push will display next function. Button 58 is used to  
31 select the function. When the function is selected, the  
32 software in apparatus will guide user through the  
33 process. If the unit has a bigger LCD display built-in,  
34 it may display all the function at once, and the user  
35 can move the cursor around the menu to select the  
36 function.

37 Whenever the apparatus does not detect any action  
38 from the user for an extended period of time, such as 10  
39 minutes, it aborts all the incomplete process and resets

1 to the idle state.

2 Therefore, the present invention discloses a  
3 telephonic apparatus for processing electronic messages  
4 which includes a means for adapting to an existing  
5 telephone line for receiving electronic messages. The  
6 telephonic apparatus further includes a processing means  
7 for responding to the electronic messages and for  
8 storing the messages therein. In another preferred  
9 embodiment, the telephonic apparatus further includes an  
10 user interface means for providing information to an  
11 user relating to a reception of the electronic messages.

12 Fig. 6 is the flow chart of a typical registration  
13 process. The user only needs to push a few buttons (step  
14 101 in the diagram) and enter the phone number (step  
15 103). The process will automatically take place by doing  
16 steps 104-111 and an E-mail address will be assigned and  
17 displayed (step 108). Step 111 is to search the phone  
18 number of the best E-mail server for the user to dial in  
19 based on user's phone number and save the number in the  
20 apparatus.

21 There are two ways to communicate between an E-mail  
22 apparatus and its server. One way is auto-connect, the  
23 other is the conventional logon process. When the E-mail  
24 apparatus initiates a call to the server, the server  
25 will try to auto-connect first. It is an automatic  
26 process and requires no user attendance. The first  
27 requirement for the auto-connect is that the server  
28 knows the user's E-mail address and the machine ID of  
29 the E-mail apparatus. The second requirement is that the  
30 server and the E-mail apparatus have the same derived  
31 password. The derived password is a code generated by an  
32 equation based on the P code (programmable code), the  
33 user's phone number and the machine ID. In order to do  
34 transaction, both need to share the same equation.  
35 Checking the machine ID and the derived password, the  
36 server can determine the legitimacy of the request from  
37 the E-mail apparatus. The auto-connect provides the  
38 convenience of automatic downloading mail. But if the  
39 checking fails, the server will ask the user to enter

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1       the password. This is the case when a different machine  
2       is used to download mail, the E-mail apparatus has a  
3       different machine ID. The server will not use auto-  
4       connect, and a conventional logon process is required to  
5       access for security reasons.

6           In the case of a server initiating the call to an  
7       E-mail apparatus, the auto-connect is the only way to  
8       communicate and get/give access. In other words, only  
9       the designated server can deliver mail to the designated  
10      E-mail apparatus. This is to provide security and  
11      convenience. if the user gets a new E-mail apparatus, a  
12      change of registration is required to get the auto-  
13      connect function.

14           The following is a detailed process of the access  
15      legitimacy checking in the auto-connect mode. First, the  
16      apparatus sends its unique serial number (i.e. machine  
17      D) to the E-mail sever. Secondly, the apparatus sends  
18      its E-mail address to the server. if these two do not  
19      match, the server will ask the user to enter the  
20      password and the conventional logon process takes place.  
21           Otherwise, the E-mail apparatus will proceed to send its  
22      programmable code or P code and the derived password to  
23      the server. The derived password is generated from the  
24      machine ID, P code and user's phone number. It is sent  
25      to the server and compared against the derived password  
26      from the server. If the server checks and finds it  
27      correct the access is authorized. The programmable code  
28      or P code to the E-mail sever is used as an instruction  
29      to screen the incoming mail and to generate a derived  
30      password.

31

32           Fig 7. is the flow diagram to show how the  
33      apparatus connects to the E-mail server, sends the  
34      outgoing mail and receives the incoming mail. It can be  
35      performed on a predetermined time daily (which starts  
36      from step 122 in the diagram) or upon the request from  
37      the user (which starts from step 121 in the diagram).  
38      Steps 127, 129 and 130 are where security and screening  
39      processes take place. Steps 134-138 are designed to

1 prevent the overflow of incoming mail and protect the  
2 integrity of the received mail. The details are  
3 explained later.

4 Fig 8. is the flow diagram of how an E-mail  
5 apparatus responds to a request from the server.  
6 whenever there is an incoming call, the apparatus will  
7 do "off-hook" (step 142) and check if it is an E-mail  
8 request (step 143). if it is not, the call will be  
9 directed to regular voice communication as steps 144-  
10 146. Otherwise, it proceeds to step 147. If the machine  
11 ID and derived password checking passes, the transaction  
12 starts. if it fails, the call is terminated. Step 148 is  
13 an option. It will inform the addressee of a potential  
14 problem on the mail delivery. The mail transfer  
15 transaction can process the outgoing mail (step 149) and  
16 check if the total mail size fits into the E-mail  
17 apparatus. if not, only parts (extracted) of the mail  
18 are delivered (step 153). Before terminating the  
19 process, the incoming mail indicator is updated (step  
20 155).

21 The following is the detailed description on how  
22 the E-mail server screens the incoming mail. It includes  
23 sorting, extracting and repackaging before the delivery  
24 of the mail.

25 The present invention uses the extension of the E-  
26 mail address and the programmable codes or P code  
27 received from the apparatus to determine the importance  
28 of the incoming mail. The E-mail address is based on the  
29 naming convention on the Internet, called Domain Name  
30 System (DNS), with additional field. The DNS has the  
31 general format as:

32 <someone>@[subdomain].[subdomain]....<domain>  
33 where the <...> represents required elements and [...] is  
34 optional portion. A typical example looks like:  
35 jsmith@sales.abc.com for John Smith in the sales  
36 department of ABC corporation "jsmith" is the account  
37 name for John Smith. It is assigned to him by the system  
38 administrator of the host computer. Usually, it is the  
39 logon name used to access the host computer. And abc.com

1       is the name of the host computer connected to the  
2       Internet network There is governing body for the host  
3       name assignment The name will be translated into 'P  
4       address and recognized by the peer on the network Hence  
5       a mail from bigbird@xyz.com can be delivered to abc.com  
6       host computer through the global network, internet. When  
7       the host computer named abc.com receives the mail, it  
8       knows its subdomain, sales. It sends the mail to the  
9       internal E-mail server in sales department of ABC  
10      corporation. When John Smith logons the computer, he  
11      will be notified of the arrival of the E-mail.

12       The present invention uses some extensions on top  
13      of the DNS to provide some enhancements. The new  
14      extended E-mail address for jsmith@sales.abc.com become  
15      jsmith[.<specialcodes>]@sales.abc.com. The general  
16      format becomes:

17      <<someone>.[specialcodes][ClassofMail]@[subdomain].[...].<dom ain>  
18       One example looks like:jsmith.4567ER@sales.abc.com.  
19       Here "4567" is used to compare with the P code on the  
20      apparatus. The result of the comparison determines the  
21      importance of the incoming mail. An incoming mail with  
22      special codes completely matching the P code will get  
23      the highest priority. A mail with partially matched  
24      codes will gain some attention based on how close the  
25      address extension codes compare with the security code.  
26       In the above examples, "E" indicates the mail is Express  
27      mail, so it will be delivered in a more timely fashion.  
28       The "R" indicates the mail is registered. It requires a  
29      return receipt when the mail is delivered successfully.  
30       A mail without the special codes on the E-mail address  
31      will be treated by the E-mail server as a regular bulk  
32      mail.

33       Since the E-mail ready telephone apparatus is  
34      likely to be a small special-purpose device, the  
35      relatively limited capacity requires more careful  
36      management The P code provides a very simple way to sort  
37      the incoming mail and prevent the flooding of the junk  
38      mail. But, even with the screening feature, the  
39      unexpected volume of incoming mail may still cause mail

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1      box overflow. The mail repackaging function on the  
2      server will prevent this from happening. It works as  
3      follows.

4           After the legitimacy checking, the E-mail server  
5      gets the information of available storage on the E-mail  
6      apparatus and decides what to send. If the total size of  
7      the incoming mail exceeds the available storage space on  
8      the apparatus, the E-mail server extracts the incoming  
9      mail and "repackages" the E-mail and sends it to the  
10     apparatus. The extracting process may reduce the mail  
11     size by taking the whole content of high priority mail  
12     but only the subject, name of sender from the lower  
13     priority mail. It may use a complicated method to  
14     achieve the best result from extracted mail. The  
15     protocol puts the intelligence and complexity to the E-  
16     mail server but keeps the E-mail apparatus simple. It is  
17     an important concept in the present invention.

18       Fig 9. is the flow diagram of how an E-mail server  
19      processes the mail. Step 166 actually is a two-step  
20     process as explained before in Fig. 7. Step 170 sending  
21     the outgoing mail and steps 171-172 checking and sorting  
22     incoming mail can be done in parallel. Different class  
23     of mail may take different steps as shown in step 163  
24     (for express mail) and step 176 (registered mail). This  
25     flow diagram exemplifies how a mail is processed.

26       Fig. 10 exemplifies the overall network connection.  
27      The E-mail ready telephone 200 connects to its local E-  
28      mail server 202 through the existing telephone network  
29      201. Usually, the local E-mail server 202 connects to  
30      the host computer 204 with a LAN (local area network)  
31      203. A global network 205 links the host computer 204  
32      and 206 together. The network 205 usually is a WAN  
33      (wide-area network). Computers 208, 209, 210 and the host  
34      computer 206 are connected by a LAN 207. A user can send  
35      an E-mail from computer 208 to an addressee of the E--  
36      mail ready telephone system 200. The E-mail will travel  
37      to the host computer 206 through the LAN 207. The host  
38      computer 206 serves as a gateway to the global network  
39      205. The mail will be passed to the WAN 205. It may

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1 travel through several host computers before reaching  
2 the host computer 204 which has the correct domain name  
3 of the E-mail address. Then the host computer 204 will  
4 look at the E-mail address or the sub-domain name and  
5 send the mail to Local server 202 through Local server  
6 203. The mail will stay in the server and the process of  
7 Fig. 9 takes place. The server will deliver the mail  
8 either by dialing the addressee's phone number or by  
9 just waiting for the request from E-mail ready  
10 telephone. Those are the process flows in Figs. 7 and 8.  
11 All the communication process, including legitimacy  
12 checking, mail size checking and mail transfer, taken  
13 place between the server and the E-mail ready apparatus  
14 are through the telephone network 201. When the E-mail  
15 apparatus initiates the connection, as described in the  
16 process flow of Fig. 7, the server will check if it is  
17 the right machine before giving the mail. If the machine  
18 ID checking fails, the user has to enter the password to  
19 gain access. If the server initiates the call to the E-  
20 mail apparatus and finds the incorrect machine ID, mail  
21 won't be delivered. But the E-mail apparatus will  
22 signifies the addressee of the failed attempt In any  
23 case, the server has to request the information of the  
24 available storage space on the E-mail apparatus before  
25 sending the mail. It may be necessary for the server to  
26 determine the priority of the mail based on the p code  
27 and extract partial information for delivery. In other  
28 words, it is server's responsibility to deliver the  
29 proper size of mail to the apparatus.

30

31 **DETAILED DESCRIPTION OF A SECOND EMBODIMENT**

32 Referring to Fig. 11, the network infrastructure  
33 (for a network such as the internet) 1014 is comprised  
34 of a number of interconnected servers 1012 communicating  
35 with each other using a common protocol (such as  
36 TCP/IP). A user may communicate to another user by  
37 using a computer 1010 that is connected to a server that  
38 has a point of presence on the network. The user may  
39 then send a mail message to another user having an

1 address at a computer connected to another server.  
2 Under this paradigm, computers are needed at both ends  
3 of the communication link and the costs for the  
4 computers may be quite high. Additionally, local area  
5 network (LAN) is used extensively in the corporate  
6 environment to connect the user's computer to the mail  
7 server. The LAN allow the user's computer to  
8 communicate to mail server in real time which acts like  
9 a local post office in the e-mail world. Real time  
10 communication between the user computer and the server  
11 allows e-mail messages be sent and received in a timely  
12 manner. However, LAN or any existing real time network  
13 is expensive and difficult to install for small  
14 businesses and households. In these situations, a phone  
15 line (voice or ISDN) is used for most people to  
16 communicate with the mail server from their home  
17 computers. This approach reduces the cost at the price  
18 of real time connection. Without real time  
19 communication, the communication efficiency and  
20 convenience is greatly reduced.

21 Referring to Fig. 12, an e-mail messaging system of  
22 the present invention utilizing the existing internet  
23 infrastructure is presented. The user can use a low  
24 cost e-mail messaging device 1018 to communicate with a  
25 mail server 1016 or another e-mail messaging device  
26 1018. The device in accordance with one embodiment of  
27 the present invention is simply a low cost stand alone  
28 device capable of receiving a notification that one or  
29 more e-mail messages have been received at the local  
30 server 1016 waiting for retrieval. The device also is  
31 capable of identifying an incoming signal as an e-mail  
32 message signal, receives the incoming e-mail messages  
33 and stores them. Moreover, the device can provide the  
34 needed functional components for the user to compose an  
35 e-mail message and deliver the e-mail message to the  
36 local server or another e-mail device directly. The e-  
37 mail device uses minimum set of electronic components  
38 and consumes very low power when compared to the power  
39 consumption of a computer. It can be left on like an

1        answer machine. There are also other possible  
2        embodiments of the e-mail device.

3        Fig. 13 illustrates the preferred hierarchy for the  
4        e-mail messaging system. At the top level, there is a  
5        main server 1020 receiving e-mail messages from the  
6        internet network and sending e-mail messages originated  
7        from the client e-mail devices to the network. The main  
8        server may be one or more computers sharing a  
9        centralized database. The main server 1020 distributes  
10      and receives e-mail messages from a number of regional  
11      servers 1022. Each regional server 1022 is designated  
12      to serve a particular geographical area and serves one  
13      or more local servers 1024. The local servers 1024  
14      interact with the client e-mail devices 1026 within its  
15      geographical area. The client device is designated to  
16      be a simple, low-cost electronic device suitable for  
17      home or business use, and it is further described infra.

18      To illustrate the message flow, the main server  
19      1020 receives an e-mail message, identifies the e-mail  
20      address, determines the regional server 1022 for this e-  
21      mail message, and sends it to the corresponding regional  
22      server 1022. The regional server may be designated to  
23      serve a city or a greater metropolitan area involving  
24      several area codes. After it receives a message, it  
25      forwards the message to the local server. A local  
26      server is designated for each sub-region and directly  
27      serves the clients and their e-mail devices.

28      Implementation wise, a regional server and a local  
29      server may be logically separate systems residing on the  
30      same physical machine. Each local server is equipped  
31      with the necessary hardware and software to communicate  
32      with clients' e-mail devices.

33      In an alternate embodiment, referring to Fig. 14,  
34      the main server 1020 may communicate directly with local  
35      servers to send and receive e-mail messages to and from  
36      the client e-mail devices.

37      Although the illustrated embodiments show a  
38      hierachial structure, it is within the scope of the  
39      present invention to implement the present invention in

1       a distributive structure.

2           In order to provide direct e-mail messages to each  
3       client, each client is identified by an unique e-mail  
4       address, and must be registered with the e-mail system  
5       in order for the e-mail system to interact with the e-  
6       mail device. Typically, the e-mail device is accessed  
7       via a local telephone line such as a voice, data or ISDN  
8       line.

9           Fig. 15 illustrates the steps for the registration  
10      process where an e-mail device (as operated by the  
11       client) dials a toll-free number, logs on the main  
12       server, and the main server performs the illustrated  
13       steps. First, the main server requests and obtains the  
14       machine identification number unique to the particular  
15       e-mail device. The machine identification number  
16       identifies the device type and also provides for theft  
17       prevention. Secondly, the main server gets the security  
18       code (password) entered by the user. The use of a  
19       security code minimizes the possibility that the mail  
20       messages being delivered or received by the wrong party.  
21       Next, the main server fetches the notification code from  
22       the e-mail device. The notification code is an optional  
23       ringing protocol used by the main server to provide a  
24       notice to the e-mail device through the use of ring  
25       tones without incurring telephone toll charges.

26           The phone number for connecting to the e-mail  
27       device is provided to the main server. For the given  
28       phone number, the main server finds the corresponding  
29       local server and its phone number, and sends this phone  
30       number to the e-mail device. The e-mail device stores  
31       it in its memory for future use. Finally, the main  
32       server completes the registration process by completing  
33       and inserting a new client information entry into the  
34       centralized database.

35

### 36       Main Server

37           To track information on the clients, the local  
38       servers, and the regional servers, two tables are  
39       maintained by the main server. In table one, each

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1 client's name, phone number, e-mail address, the local  
2 server for the client, and other administrative or  
3 accounting information are kept.

4 TABLE 1

5 Client Name	6 E-Mail Addr	7 Local Server	8 Phone Number	9 Other Info.
John Smith	jsmith	1	(210) 231-1234	
Bob Clinton	bclinton	1	(210) 231-7890	
Al Goodman	agoodman	2	(123) 789-1234	
Mike White	mwhite	2	(123) 789-4321	

10  
11 Table two contains information for each local  
12 server, information such as the address of the regional-  
13 server for the local server and the type of connection  
14 from the main server to the regional server.

15 TABLE 2

16 Local Server	17 Regional Server Address (e-mail)	18 Connection Type
1	system@region1.com	Internet
2	postmaster@region2.com	(210) 111-1234 (leased line)

19  
20 For example, there are two local servers illustrated in  
21 table two. The regional server for local server one is  
22 connected to the main server via the internet, and the  
23 regional server for local server two is connected to the  
24 main server via a leased line for high speed  
25 communication. Other types of connection methods  
26 between the regional servers and the main server can be  
27 utilized as well (e.g. satellite) if they are  
28 economically feasible. Additional tables can be created  
29 and maintained as needed.

30 For the purpose of organizing incoming e-mail  
31 messages, a mailbox is dedicated to each client and  
32 maintained by the main server. The mailbox can be a  
33 file or any other type of indexable storage system.

34 Referring to Fig. 16a, the main server is

1       instructed to check for and process incoming and  
2       outgoing mail messages every x minutes where x is a  
3       defined period of time which can be a function of the  
4       load on the system.

5           Referring to Fig. 16b, the steps for processing  
6       outgoing mail messages are illustrated. Outgoing mail  
7       messages come from clients of the e-mail system for  
8       delivery to other users on the net. This process is  
9       performed every so often to ensure mail is processed in  
10      a timely manner. If there is a new mailbag from a local  
11      server, the new mailbag is decompressed, and the mail  
12      messages are extracted from the mailbag and passed to  
13      the send mail utility. The send mail utility can be a  
14      common mail program (e.g. Unix Operating System sendmail  
15      utilities) with the capability of sending and receiving  
16      e-mail messages.

17       Fig. 16c illustrates the steps for processing  
18      incoming mail messages where a mailbag is prepared for  
19      each local server. The local servers are indexed  
20      consecutively starting with index equals one 1030. For  
21      each local server, a new mailbag is initialized 1032.  
22      For each client serviced by the particular local server,  
23      the client's mailbox is searched, and new messages are  
24      extracted and appended to the mailbag for the particular  
25      local server 1034. The new mail messages are then  
26      deleted from the mailbox for the client 1034.

27       If the mailbag is not empty, the mailbag is  
28      compressed, and a confirm flag is set 1038. If the size  
29      of the mailbag after compression is greater than the  
30      maximum size allowed for mail delivery, the mailbag is  
31      split into two or more smaller mailbags. A copy of the  
32      mailbag(s) is then stored in a To-Be-Confirmed directory  
33      for later confirmation, and the mailbag(s) is sent to  
34      the regional server for the particular local server.

35       After all of the mailboxes for a particular local  
36      server have been processed, the process repeats until  
37      all of the local servers' mailbags have been processed.

38       The main server also performs a confirmation  
39      process to ensure that the mailbags and the individual

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1 mail messages have been received. Referring to Fig.  
2 16d, the steps for the confirmation process is  
3 illustrated. Every so many minutes, the confirmation  
4 process is executed. For each confirm flag that is set  
5 (confirm [i]=true), the main server searches for a  
6 confirmation message from the corresponding local  
7 server. If a confirmation message is found and not all  
8 the mail messages have been delivered and the elapsed  
9 time is greater than the maximum allowed elapsed time,  
10 the undelivered mail message is placed in an undelivered  
11 mail directory and the operator is notified. If the  
12 confirmation message is not found and the elapsed time  
13 has exceeded a maximum allowed elapse time, the operator  
14 is notified. If all the mail messages are confirmed as  
15 successfully delivered, the mail bag is placed into  
16 archive.

17

18 **Regional Server**

19 The function of the regional server is to serve as  
20 an intermediary between the main server and the local  
21 servers. The regional server is configured to have the  
22 function of an ISP Point-of-Presence (like an internet  
23 service provider) in order to receive and send mail via  
24 the internet. It maintains a shell account and a  
25 mailbox for each of the local server it serves. The  
26 regional server interacts with its local servers to  
27 facilitate the handling of incoming and outgoing  
28 mailbags. The mail utilities commonly available with  
29 the operating system (e.g. Unix) of the regional server  
30 can be utilized to achieve the tasks described.

31 The regional server can be configured to operate as  
32 a local server as well.

33

34 **Local Server**

35 Each local server maintains a table of clients.  
36 For each client, referring to Table 3, the client's  
37 name, e-mail address, phone number, notification type,  
38 ringing protocol, security code, machine ID, and other  
39 miscellaneous information are kept.

1

TABLE 3

2

Name	E-Mail Address	Phone Number	Notification Type	Ringing Code	Security Code	Machine ID
John Smith	jsmith	(210) 231-1234	notify-only	0.5/ 0.25	123	789
Bob Clinton	bclinton	(210) 231-7890	call-back	0.3/ 0.5	456	111

6

7           There are three notification/delivery types:  
 8        notify-only, call-back mail delivery, and direct mail  
 9        delivery. In the notify-only notification method, the  
 10      local server calls the client's e-mail device using the  
 11      specified ringing protocol from the table. No  
 12      connection is actually made between the local server and  
 13      the e-mail device. The rings are set up in such a  
 14      manner that the e-mail device is programmed to recognize  
 15      the ring pattern and determine that a notification is  
 16      being delivered by the local server. When the  
 17      notification is successfully received, the e-mail device  
 18      activates an indicator light on the e-mail device. The  
 19      client/user can then retrieve the message at his or her  
 20      convenience using the e-mail device or other means. If  
 21      in the process of notifying the e-mail device, an actual  
 22      connection is made, the e-mail device can be set to call  
 23      the local server to retrieve the e-mail messages or  
 24      messages can be directly delivered.

25           In the call-back mail delivery method, similar to  
 26      the notify-only method, the ringing protocol is used to  
 27      notify the client's e-mail device that there is one or  
 28      more e-mail messages waiting at the local server. The  
 29      notification causes the e-mail device to call the local  
 30      server and retrieve the e-mail messages.

31           In the direct mail delivery method, the local  
 32      server calls the e-mail device, connects with the e-mail  
 33      device, and delivers the e-mail messages to the e-mail  
 34      device. The client may designate any one of the three  
 35      notification methods as long as it is supported by the

1 e-mail device and the local server.

2 The optional ringing protocol is a method for the  
3 local server to provide notice to the e-mail device  
4 without incurring toll charges. It utilizes and  
5 controls the length of ring time and the length of time  
6 between rings. Using this method, a calling device  
7 (here the local server) dials the number, detects ring  
8 tone for  $x_1$  second(s), hangs up, waits for  $w_1$  second(s),  
9 dials the number again, detects ring tone for  $x_2$   
10 second(s), and hangs up. The receiving device (here the  
11 e-mail device) upon detecting this particular ringing  
12 protocol determines that a notice is being delivered by  
13 a calling device, and accordingly executes a  
14 preprogrammed routine (if any). The ringing procedure  
15 of dial, detect, hang up, and wait is not limited by a  
16 specific number of iterations and may be repeated a  
17 number of times. In the preferred embodiment, this  
18 procedure is repeated three times, using  $x_1$ ,  $x_2$ ,  $x_3$  and  
19  $w_1$ ,  $w_2$ . The method may be simplified by setting  $w_1$  and  
20  $w_2$  to have the same length of time. Other combinations  
21 are possible as well as long as the e-mail device is  
22 configured to detect and recognize the designated  
23 ringing protocol. In the preferred embodiment of the  
24 present invention, a ringing code,  $n/m$ , is used for each  
25 client where  $x_1$  is a constant,  $x_2$  equals  $x_1+n$ , and  $x_3$   
26 equals  $x_1+n+m$ . Referring to Table 3, for client John  
27 Smith, a ringing code of 0.5/0.25 refers to  $x_2$  being  
28  $x_1+0.5$  second and  $x_3$  being  $x_1+0.5+0.25$  second, where  $w_1$   
29 and  $x_1$  are constants. Similarly, the ringing code for  
30 Bob Clinton is 0.3/0.5 which refers to  $x_2$  being  $x_1+0.3$ ,  
31 and  $x_3$  being  $x_1+0.3+0.5$ , and  $w_1$  and  $x_1$  again being  
32 constants. Generally speaking, the ringing tone should  
33 not be very long. Note that generally speaking it is  
34 more reliable to use the difference between ring tones  
35 rather than timing the duration of each ring tone.

36 In utilizing the ringing protocol with  
37 communication switching devices in a central office  
38 where a switching device passes back a signal informing  
39 the calling device that the switching device is dialing

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1 and ringing the line, once the calling device receives  
2 such a signal, the calling device can determine the  
3 length of ring time and hang up accordingly. Other  
4 implementation of the above described method can be  
5 applied to other types of calling devices and/or  
6 switching devices as well.

7 A security code (client password) may be set by the  
8 client to provide additional security measures. In  
9 order to protect the e-mail device itself from theft (as  
10 well as the e-mail messages) a machine identification  
11 number (serial number) particular to each machine is  
12 used. Thus, if the e-mail device is ill-gotten by  
13 another, it will not work. The machine ID also allows  
14 the local server to identify the e-mail device machine  
15 type.

16 In facilitating mail delivery, the local server  
17 interacts with the regional server/main server and  
18 clients' e-mail devices.

19 In interacting with the regional server, referring  
20 to Fig. 17a, the local server checks for one or more new  
21 mailbags from the regional server every x minutes. If a  
22 new mailbag is found, the mailbag is decompressed, mail  
23 messages are extracted from the mailbag and placed into  
24 the mailbox for the particular client.

25 Referring to Fig. 17b, every so often each client's  
26 mailbox is checked to see if there are any e-mail  
27 messages need to be delivered. If the mailbox for the  
28 particular client is not empty, the e-mail message(s) in  
29 the mailbox is delivered via the designated  
30 delivery/notification method for the particular client,  
31 i.e., one of the available delivery/notification  
32 methods. For each of the delivery/notification methods,  
33 there is a corresponding procedure call.

34 For the notify-only method, referring to Fig. 17c,  
35 the last time the local server interacted with the  
36 client's e-mail device (logon time) is fetched. If no  
37 new mail has arrived since the last logon time, the  
38 process ends. If there is one or more new e-mail  
39 messages and no notification has been sent to clients'

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1 e-mail devices yet, the ringing protocol described above  
2 is applied. First the local server calls the client's  
3 e-mail device. If the client's phone line is busy, the  
4 local server waits a few minutes before attempting to  
5 call the e-mail device again. If the phone line is not  
6 busy, the local server, through its interfacing  
7 hardware, detects the ring tone for  $x_1$  period of time  
8 and hangs up, wait  $w_1$  period of time, and calls the e-  
9 mail device again. If the line is busy, the process  
10 starts over after waiting a certain period of time.  
11 Otherwise, the local server detects ring tone for  $x_2$   
12 period of time and disconnects. The local server calls a  
13 third time, rings for  $x_3$  period of time and hangs up.  
14 This completes the notification process.

15 For the call-back mail delivery method, referring  
16 to Fig. 17d, the above described notification process is  
17 used, and the local server sets the hardware  
18 communication device in auto answer mode. If the  
19 client's e-mail device calls back before the end of a  
20 specified time period, a handshaking process is executed  
21 to verify the security code and the machine code. Then,  
22 any outgoing mail messages is retrieved from the e-mail  
23 device and any incoming mail is delivered to the e-mail  
24 device. When the file exchange process is completed,  
25 the line is disconnected, a confirmation signal on the  
26 successful delivery of the e-mail messages is sent to  
27 the main server via the regional server, and any  
28 outgoing mail messages is sent to the main server via  
29 the regional server as well. If the e-mail device does  
30 not call back after a set period of time and if the try-  
31 counter (that keeps count the number of tries) exceeds a  
32 maximum try value for the delivery of the messages, it  
33 is deemed that mail delivery has failed and an error  
34 messages is generated and sent to the regional server to  
35 forward to the main server. Otherwise, the try-counter  
36 is incremented and the program flow starts from label 2  
37 again to repeat the process.

38 For the direct mail delivery method, referring to  
39 Fig. 17e, a try-counter is initialized and the local

1 server calls the client's e-mail device. If the e-mail  
2 device fails to respond, the try-counter is incremented;  
3 and if the try-counter is greater than a maximum try-  
4 counter value, an error is deemed to have occurred and  
5 an error message is generated and sent to the server.  
6 Otherwise, the process is repeated by branching off to  
7 label 3. If the e-mail device responds, the process for  
8 handshaking, exchanging of any outgoing and any incoming  
9 e-mail messages, sending of a confirmation signal, and  
10 sending of any outgoing mailbag as above described for  
11 the call-back mail delivery process is executed.

12 In the handshaking process, referring to Fig. 17f,  
13 the security code is first verified. If the security  
14 code is incorrect, the handshaking process stops and  
15 down stream procedures are not executed. This condition  
16 is reported to the regional server and the main server  
17 for special handling. The machine ID verification  
18 process of the e-mail device is similar to the security  
19 code verification process.

20 In the exchange-mail-files process, referring to  
21 Fig. 17g, the local server connects to the e-mail device  
22 and retrieves any outgoing mail from the e-mail device.  
23 Next, the amount of available storage in the e-mail  
24 device is determined. If the size of the incoming mail  
25 messages is greater than the available storage size, the  
26 incoming mail messages are repackaged. The repackaged  
27 incoming mail is then sent to the e-mail device, and the  
28 process ends. In repackaging the incoming mail  
29 messages, referring to Fig. 17h, the incoming mail  
30 messages are sorted in order of priority where priority  
31 is determined by factors such as the priority code of  
32 the message and the date and time stamp of the message.  
33 The ordered messages are then selected in order of  
34 priority up to the available storage space but leaving  
35 space for a system e-mail message to the client that  
36 there are additional messages waiting for retrieval or  
37 delivery.

38 A priority code of the present invention can be  
39 included as part of the e-mail address itself by

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1       comparing a number in the e-mail address itself to the  
2       security code. For example, for jsmith@emailsys.com  
3       having a security code of "124", an e-mail address such  
4       as "jsmith\_123@emailsys.com" would have a higher  
5       priority than an e-mail address such as  
6       "jsmith\_456@emailsys.com" because the number "123" is  
7       closer to the security code of "124" than the number  
8       "456" is to "124". Thus, by having a single e-mail  
9       address, the owner of the e-mail address can give out e-  
10      mail addresses with different priority codes.

11

12      Client E-Mail Device - Software

13       The client's e-mail device has both a hardware  
14       component as well as a software component. The e-mail  
15       device can communicate with the local server, regional  
16       server, main server, or another e-mail device (for peer-  
17       to-peer communication).

18       Referring to Appendix A, the software pseudo-code  
19       for the client's e-mail device is illustrated. When the  
20       device is first turned on, a power-on self-test is  
21       executed. If there is a fatal failure, the program flow  
22       branches to the Fatal\_Error\_Stop label, sets the fatal  
23       error indicator, and halts the system. If a minor  
24       failure occurred, the program flow branches to the  
25       Warning\_Code label, sets a warning code indicator and  
26       resumes the program flow. Next, the phone line status  
27       is checked. If it is busy, the device will wait until  
28       the line is not busy. The e-mail device is then placed  
29       in auto-answer mode and the registers for the device are  
30       initialized for operation. If there is any failure  
31       during this initialization process, a warning code is  
32       posted. After the initialization process, the software  
33       continuously loops to check for an interrupt from the  
34       interrupt registers. If an interrupt is found, the  
35       program branches to the Interrupt\_Service routine. The  
36       Interrupt\_Service routine reads the interrupt register,  
37       determines the interrupt type, and branches to the  
38       corresponding interrupt routine.

39       An interrupt may be caused by one of the several

1 subsystems, where the types of interrupts include  
2 registration request interrupt, call-back mail delivery  
3 interrupt, dial server interrupt (which calls the same  
4 procedure as that of the call-back mail delivery  
5 interrupt), incoming mail delivery interrupt, and  
6 transfer-abort interrupt.

7 If the call-back interrupt flag is set, the call-  
8 server routine is executed where the communication  
9 module is set to dial the local server phone number and  
10 execute an In\_Mail routine.

11 The In-Mail routine first performs handshaking with  
12 the local server communication module. It then sends  
13 out any outgoing mail messages prepared by the client,  
14 and requests and receives a confirmation signal from the  
15 local server. If the confirmation signal from the local  
16 server is incorrect, the outgoing mail messages are sent  
17 again by branching the program flow to label SendM.  
18 Otherwise, the device is instructed to receive incoming  
19 mail messages. If the incoming mail messages are not  
20 received correctly, a confirmation signal is generated  
21 to sent to the local server which would cause the local  
22 server to deliver the mail messages again. When the  
23 messages are correctly received, the mail indicator is  
24 set.

25 In the handshaking routine, the device receives the  
26 security code from the local server, verifies the code,  
27 and branches to the Bye routine if it is incorrect.  
28 Similarly, the device receives the machine ID, verifies  
29 the ID, and goes to the Bye routine if it is incorrect.  
30 The device then sends the security code and the  
31 available storage size to the local server.

32 Back to the Interrupt\_Service routine, if the  
33 Incoming\_Mail interrupt flag is set, the program flow  
34 branches to the In\_Mail routine as described above.

35 If the Registration\_Request interrupt flag is set,  
36 this flag indicates that the client has placed the  
37 device in registration mode in order to register with  
38 the main server. This process is generally executed  
39 when the device is being set up for the first time or

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1       when the device has been moved to a new location. The  
2       program flow branches to the Registration\_Request  
3       routine, where the device dials a designated phone  
4       number for registration. Generally, this is a 800 toll  
5       free number connected to the main server. When  
6       connected, the device delivers the machine ID, the  
7       security code, and the client's phone number to the main  
8       server. The main server determines the particular local  
9       server for serving the client's e-mail device based upon  
10      the given phone number. The phone number for the  
11      particular local server is sent to the client device,  
12      and the client device retains the number in memory for  
13      later use.

14       The dial\_server interrupt flag is set by the client  
15      to send and retrieve mail messages. Like the call\_back  
16      interrupt, it calls the call\_server routine.

17       In the case where the local server is using the  
18      direct mail delivery method, the Incoming-mail flag is  
19      set and the In\_Mail routine is executed as described  
20      above.

21       In the case where a request has been made to  
22      disconnect the line, the Transfer-Abort flag is set  
23      which causes any phone connection to be disconnected.

24       In the case where the hardware for the e-mail  
25      device is part of another computer system (e.g. personal  
26      computer system) in the form of an expansion card or a  
27      part of an expansion card, the interface with the e-mail  
28      device can be integrated with a mail program of the  
29      computer.

30

#### Client E-Mail Device - Hardware

31       The hardware component of the e-mail device may be  
32      embodied in several different manners. In one form, the  
33      e-mail device is a low-cost stand alone device directly  
34      connected to the phone line before the phone line is  
35      connected to other devices (e.g. answering machine, fax  
36      machine, etc.). The stand-alone embodiment interacts  
37      with the e-mail system as described above. More  
38      particularly, the software for the e-mail device as

1 described above is configured and stored in the ROM of  
2 the e-mail device.

3 In another hardware embodiment, the e-mail device  
4 is an integral part of a computer expansion card having  
5 power supplied from two sources, the computer system  
6 itself or an external power supply. Referring to Fig.  
7 18a, an expansion card 1050 having an edge connector  
8 1052 is illustrated. The expansion card is insertable  
9 into an edge connector slot connected to the bus of a  
10 computer system. The expansion card includes a CPU 1054  
11 (or microcontroller) directly polling an I/O register  
12 1056 that is communicatively connected to a notification  
13 module 1058. The I/O register 1056 receives information  
14 from the notification module 1058 and the user input and  
15 control device 1057 (which can be a keyboard, a keypad,  
16 dip switches, etc.) for entering security code, e-mail  
17 messages, or other inputs, and generates signals for  
18 indicators 1059 to indicate the status of any messages  
19 and the e-mail device. The notification module sends  
20 and receives information via a phone line connection and  
21 interacts with the communication module 1062. When the  
22 expansion card is inserted into the computer system, a  
23 bus controller 1064 controls the data flow to and from  
24 the computer system (not shown) via the edge connectors  
25 1052. Information is passed between the flash memory  
26 1066, the ROM 1068, the RAM 1070, the CPU 1054, and the  
27 communication module 1062 through an internal bus 1072.  
28 The communication module can be a fax/modem chipset.  
29 The expansion card 50 may be powered by one of two  
30 sources, power from the computer system via trace 1074  
31 or power from an external source via trace 1076 and  
32 power jack 1078. The power switching and conversion  
33 module 1080 detects power from one of the two sources,  
34 performs any power conversion from one voltage level to  
35 another voltage level if it is needed, and routes the  
36 power to the components on the expansion card 1050. The  
37 power detection and switching is automatically performed  
38 without interruption to the operation of the e-mail  
39 device. Thus, no interruption of operation would occur

1 if power is switched in the midst of sending or  
2 receiving e-mail messages.

3 In this embodiment, when the computer system is on,  
4 the expansion card may be controlled and operated by the  
5 software of the computer system. When the computer  
6 system is off, unattended, or not controlled by the  
7 software of the computer system, the expansion card  
8 obtains its power supply from an external source and  
9 operates in accordance with the software described  
10 above.

11 Mailing program on the computer system having the  
12 e-mail expansion card would have software routes for  
13 sending and retrieving e-mail messages between the  
14 computer system and the e-mail expansion card.

15 Referring to Fig. 18b, the pseudo-code for the computer  
16 system to retrieve e-mail messages from the expansion  
17 card is illustrated. The status of the card is first  
18 verified. If the card is not busy, the in-mail message  
19 flag (indicating the existence of new e-mail messages)  
20 is checked. If there is a new message, the message is  
21 transferred to the computer system and the storage area  
22 is cleared. Then, the message is displayed on the  
23 computer screen of the computer system. Referring to  
24 Fig. 18c, the pseudo-code for the computer system to  
25 transfer prepared e-mail messages to the expansion card  
26 for outbound is illustrated. If the card status is not  
27 busy and if there is enough storage space to store all  
28 of the e-mail messages, the e-mail messages are  
29 transferred to the expansion card and the computer can  
30 be turned off. If the storage on the card is  
31 insufficient, the user is informed to wait until the  
32 messages are sent before turning the computer off.

33 In yet another hardware embodiment, referring to  
34 Fig. 19a, the communication module of Fig. 18a is a  
35 commonly available external fax/modem. For an external  
36 modem, its serial port 1086 may be connected to the  
37 serial port of the computer system. The expansion card  
38 1082 (now without the communication module) communicates  
39 with the modem 1084 through serial port 1086. The

1 notification device may be connected to the modem via  
2 standard phone jacks and a phone line 1088. In this  
3 embodiment, the cost of the expansion board now without  
4 the communication module is reduced. A phone line  
5 signal would come in on jack 1090 and be processed in  
6 the same manner as described above.

7 Fig. 19b illustrates the embodiment for an internal  
8 modem where the e-mail expansion card 1082 is mounted on  
9 the mother board 1083 and has a phone jack 1092 for  
10 receiving the phone line and phone signal and a phone  
11 jack 1093 for passing the phone signal to the modem card  
12 1094 via phone line 1097. The modem card 1094 is  
13 mounted on the mother board 1083 as well and receives  
14 the phone signal at phone jack 1095 and passes the phone  
15 signal out at phone jack 1096. The e-mail expansion  
16 card directly communicates with the modem card via  
17 ribbon 1098. Ribbon 1098 on one end is communicatively  
18 attached to the expansion card 1082 and on the other end  
19 it can be a ribbon cable inserted into a bus connector  
20 slot 1105 of the mother board along with the modem card.  
21 Fig. 19c shows that the ribbon cable 1098 at the end  
22 having three contact surfaces 1099, 1101, and 1103.  
23 Contact surface 1103 makes electrical contacts with  
24 selected tabs on one side 1107 of the edge connector of  
25 the modem card 1094 and selected tabs on one side of the  
26 bus slot 1105. Contact surface 1101 makes physical  
27 contact (but no electrical contact) with the bottom of  
28 the bus connector slot 1105. Contact surface 1099 makes  
29 electrical contact with selected tabs on the other side  
30 of the edge connector of the modem card 1094 and  
31 selected tabs on one side of the bus slot 1105. In this  
32 manner, the modem card can communicate with the computer  
33 system and the e-mail expansion card, and the e-mail  
34 expansion card is allowed a greater amount of direct  
35 control over the modem card. In the case where power is  
36 being supplied by an external source, the power can be  
37 supplied to the modem card through certain of the  
38 selected tabs.

39 Note that in both Figs. 19a and 19b, the e-mail

1 expansion card optionally can have complete control over  
2 the external or internal fax/modem where all  
3 communication between the CPU and the fax/modem has to  
4 pass through the e-mail expansion card. In another  
5 word, the e-mail expansion card can encapsulate the  
6 fax/modem. In Fig. 19b, encapsulating can be achieved  
7 by providing a ribbon cable having printed traces on one  
8 side and non-conductive material on the other side. The  
9 modem card nevertheless is inserted into the bus slot  
10 but it does not communicate through the traces in the  
11 bus slot. Conventional methods can be applied as well  
12 where the e-mail expansion card and the internal modem  
13 card are connected via simple ribbon and connectors on  
14 each card.

15 In yet another embodiment of the invention,  
16 referring to Fig. 19d, the e-mail device 1130 is a  
17 stand-alone card having an slot connector 1144 able to  
18 receive a regular fax/modem card 1132. The e-mail  
19 device has a connector 1138 for receiving ac or dc power  
20 supply, a communication port 1136 (such as a serial  
21 port), and a phone jack for receiving a phone line 1134  
22 and also a jack for passing a phone signal to another  
23 device 1135. Likewise, the fax/modem card 1132 has a  
24 jack for receiving a phone signal 1142 and a jack for  
25 passing through a phone signal 1143. This embodiment  
26 can be placed in a physical box.

27 Further note that although the e-mail device is  
28 illustrated as an expansion card it can be easily  
29 converted into an external device like that of the  
30 common external fax/modem device. Moreover, the  
31 expansion card can be converted to a stand alone device  
32 with a display. Moreover, communication devices are not  
33 limited to the fax/modem devices illustrated above.  
34 ISDN devices, cable modem, wireless modem, or other  
35 communication devices can be used as communication  
36 devices as well.

37 The hardware embodiment for implementing the  
38 ringing protocol described above requires a tone  
39 detection circuit. Referring to Fig. 20, on the local

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1 server side, the local server provides the dialing and  
2 answering functionalities 1052 through the use of a  
3 modem 1057 or other communication devices or modules.  
4 The modem controls the phone line 1055 to dial the  
5 telephone number of the client's e-mail device, and the  
6 tone detection circuit 1053 detects the ringing tone and  
7 reports it to the local server 1056. The local server  
8 determines the length of ringing time and instructs the  
9 modem to disconnect when the predetermined period of  
10 time has been reached.

11 On the client e-mail device end, the notification  
12 device 1054 detects the ringing signal, the time lapsed  
13 for each ringing signal and the time lapsed between the  
14 signals. It then determines whether a valid  
15 notification code has been received. Referring to Fig.  
16 21, on the client side, the microcontroller 1058  
17 operates a ringing signal detection circuit 1049 and a  
18 modem 1047 in detecting whether a valid ringing code has  
19 been received.

20

21 **Integration of the E-Mail Device**

22 The above described e-mail device may be integrated  
23 into other devices. For example, the e-mail device may  
24 be part of a phone, a fax machine, an answering machine,  
25 etc. If the e-mail device is integrated with a fax  
26 machine, e-mail messages can be readily printed out and  
27 any outgoing mail messages may be composed through the  
28 use of the numeric keypad. Fig. 22 illustrates one  
29 embodiment of the e-mail device integrated with a fax  
30 machine. In this embodiment, there is a transmitter  
31 subsystem 1100, a receiver subsystem 1102, and a modem  
32 1104 that can be connected to a telephone line 1106.  
33 The modem incorporates a control module 1125 to execute  
34 the ringing protocol described above and distinguishes a  
35 fax/modem signal from an e-mail message signal (or  
36 protocol) to activate the corresponding portion of the  
37 circuitries.

38 The transmitter 1100 can process two signals, one  
39 signal for faxing and one signal for mailing messages.

1 For faxing a document, the document is first scanned by  
2 a scanner 1108 and the scanned signal is converted to a  
3 digital format 1110. For mailing messages, the prepared  
4 mail messages are stored in memory 1114 and converted to  
5 raster graphic image 1126. Note that a number of  
6 methods are available for composing mail messages,  
7 including the use of a keyboard, a keypad, etc. The  
8 composed messages are then stored in memory. A  
9 multiplexer 1116 selects one of the two signals to pass  
10 through to the compressor 1112 and then to the modem  
11 1104 for transmission in accordance with the selected  
12 mode.

13 The receiver subsystem 1102 processes incoming fax  
14 signal or mail message signal. For a fax signal, the  
15 signal is decompressed 1118 and sent to the printing  
16 subsystem 1122 through a multiplexer 1120. For an e-  
17 mail message signal, the signal is received and  
18 processed by an integrated e-mail device (and software)  
19 1124 as described above. The output from the e-mail  
20 device is converted to image format 1126 and sent to the  
21 printing subsystem 1122 via the multiplexer 1120.  
22 Again, the multiplexer selects the signal to be sent to  
23 the printing subsystem in accordance with the selected  
24 mode.

25

#### 26 REMOTE CONTROL OF THE SERVERS

27 The servers can be remotely operated and control by  
28 using commercially available communication software or  
29 tailored software. The ringing protocol may be used to  
30 set and reset the servers. Appendix B illustrates one  
31 set of pseudo-code for remote controlling the servers.  
32 Referring to Fig. 23, the server computer 1210 is  
33 connected to the network 1200 via a direct connection  
34 1214 and through a modem 1212. The modem provides a  
35 remote login path to the server in order to control or  
36 maintain the server. If the server does not respond to  
37 the remote login, the ringing protocol of the present  
38 invention embodied in the notification device 1205 can  
39 be used to detect ringing pattern. Upon receiving a

1 proper ringing pattern, the notification device sends a  
2 signal to the server computer via line 1207 to prepare  
3 for shut-down and a signal to the power control module  
4 1206 to generate a pulse to toggle the relay 1202 for a  
5 proper period of time to reboot the computer.

6 The software described herein for implementation of  
7 the e-mail system can be written specifically for this  
8 particular application in the programming language of  
9 choice. It can also be implemented through the use of  
10 existing system mail utility programs. For example,  
11 under the Unix system, an entire set of mail utility  
12 programs are available for the sending and receiving of  
13 mail messages.

14 Although the present invention has been described  
15 in terms of the presently preferred and second  
16 embodiments, it is to be understood that such disclosure  
17 including combinations of the two embodiments is not to  
18 be interpreted as limiting. Various alterations and  
19 modifications including the various combinations of the  
20 two embodiments will no doubt become apparent to those  
21 skilled in the art after reading the above disclosure.  
22 Accordingly, it is intended that the appended claims be  
23 interpreted as covering all alterations and  
24 modifications as fall within the true spirit and scope  
25 of the invention.

## APPENDIX A

Client software codes on communication card or on a stand alone system

**Kernel**

```
POST (Power on self-test)
If fatal failure, go to Fatal_Error_Stop
If minor failure, go to Warning_code
Check line status; if busy, wait until line is not
busy;
Set up communication module in auto-answer mode
Set up other I/O registers, devices
If any failure, go to Warning_code
loop Polling interrupt
If interrupt found, jump to Interrupt_service
go to loop
```

**Fatal\_Error\_Stop:**

```
set error indicator or display
Halt
```

**Warning\_code:** (input: warning code)

```
set warning indicator (or display)
return
```

**Interrupt\_Service:**

```
Read interrupt register
Check the interrupt type

case of:
Call_back: jump to Call_server
Registration request: jump to Reg_req
Incoming_mail: jump to In_mail
Dial_server: jump to Call_server
Transfer_abort: jump to Tfr_abort
end case:

Clear the interrupt that has been serviced
return
```

**Call\_server:**

```
set up communication module to dial
read_server_number
dial_(phone)
In_mail;
return
```

**Bye:**

```
hangup
set up communication module in auto answer mode
return
```

**In\_mail:**

```
Handshaking
sendM send outgoing mail
receive transfer confirm info.
If confirmation info not correct, go to sendM
to retry
send available storage size
revM receive incoming mail
send receive confirmation info
```

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If confirmation info is not correct go to revM  
set Mail\_in indicator  
return

**Handshaking:**

check the security code, if not correct, go to Bye  
receive machine ID from server (if it is used)  
check the machine ID, if not correct, go to Bye  
return

**Reg\_req:**

dial the (800) number  
establish connection  
display greeting  
send machine ID  
send security codes  
echo the security code  
print "enter your phone number"  
read phone\_number  
send phone number  
receive and save local server number(s)  
print "registration done"  
return

**Tfr\_abort:**

save all data for immediate disconnection  
hangup  
return

## APPENDIX B

Remote monitor and control of the local server

{ Codes for every local server }

```
Program diag_report;
begin
    Do the following every hour
        begin
            run_diagnostics_and log results
            check any problem
            mail the report to the main server
        end
end
```

{ Codes on main server }

```
Program remote_monitor;
begin
Do the following for every hour
    begin
        get_new_mail: //the mail are diag report from
local server
        if there is mail
            begin
                check the report from each local server
                if there is a problem
                    begin
                        remote_dia_ctrl: //reference point
                        rlogin local server //remote login & run
diag.
                    if rlogin fail goto cold_boot
                    run more extensive diagnostics
                    if the problem is correctable correct the
program
                    else reboot //software warmboot)
                    begin
                        wait for reboot;
                        rlgoin local server
                        if rlogin fail goto cold_boot
                        if system is okay, exit
                    else
                        begin
                            remote_shutdown_process (n,m);
                            //hardware cold boot
                            // n,m are the secret code like
                            notification device
                            wait for reboot
                            rlgin local server
                            if system is okay, exit
                            else report problem to operator
                        end
                    end
                else
                    if it is too long for not receiving mail
                        begin
                            rlogin the local server
                        end
            end
        end
    end
end
```

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```
go to remote_dia_ctrl  
end
```

```
end  
end
```

```
{ The remote shutdown process uses a method similar  
to the notification device, but it requires much higher  
security in order to prevent unauthorized shutdown. So,  
the following procedure uses two codes instead of one  
code. Again the code represents the ring tone length  
difference for two consecutive dialings. The first code  
n is for the difference between the ringing period of  
the first call x1 and the second call x2, and m is for  
the difference between x2 and the ringing period of the  
third call x3. Typically, n and m are small numbers  
which can be positive or negative numbers. More codes  
can be used to achieve even greater security. }
```

```
process remote_shutdown_process (n,m);  
begin  
    start_point; //just a reference point  
    call (phone_number)  
        if line busy, wait and go to start_point  
    detect_ring_tone for x1 second  
    disconnect;  
    wait w1 seconds;  
    call (phone_number);  
        if line busy, wait and go to start_point  
    detect_ring_tone for x2 second //x2=x1+n  
    disconnect  
    wait w1 seconds;  
    call (phone_number);  
        if line busy, wait and go to start_point  
    detect_ring_tone for x3 seconds //x3=x2+m  
    disconnect;  
  
end
```

CLAIMS

I claim:

1        1. A telephonic electronic message apparatus for  
2 automatically receiving electronic messages comprising:  
3              a means for adapting to an existing telephone line  
4 for receiving said electronic messages; and  
5              a processing means for automatically responding to  
6 said electronic messages and for storing said messages  
7 therein whereby said electronic messages may be received  
8 and stored without requiring a human operation.

1        2. The telephonic apparatus of claim 1 further  
2 comprising:  
3              an user interface means for providing information  
4 to an user relating to a reception of said electronic  
5 messages.

1        3. The telephonic apparatus of claim 2 further  
2 comprising:  
3              a telephone adapting means for connecting to a  
4 telephone;  
5              said processing means further including a telephone  
6 interface means for detecting an incoming signal  
7 received from said telephone line and for determining if  
8 said incoming signal being an electronic message and for  
9 transmitting said incoming signal to said telephone when  
10 said incoming signal being detected is determined not an  
11 electronic message.

1        4. The telephonic apparatus of claim 2 wherein:  
2              said user interface means further including a  
3 display means for displaying a message relating to the  
4 reception of said electronic messages.

1        5. The telephonic apparatus of claim 2 wherein:  
2              said processing means further including a message  
3 storage means for storing said electronic messages  
4 therein.

1       6. The telephonic apparatus of claim 3 further  
2 comprising:  
3               an electronic message exporting means for  
4 delivering said electronic messages via a transmitting  
5 means to a receiving device.

1       7. The telephonic apparatus of claim 6 wherein:  
2               said electronic message exporting means including a  
3 television interface means for delivering said  
4 electronic messages via said transmitting means to  
5 a television for displaying said electronic  
6 messages thereon.

1       8. The telephonic apparatus of claim 7 wherein:  
2               said user interface means further including an  
3 message exporting control means for controlling a  
4 display of said electronic message on said television.

1       9. The telephonic apparatus of claim 3 further  
2 comprising:  
3               an automatic registration means for storing  
4 required registration data therein and for automatically  
5 dialing and registering with a network server for  
6 receiving said electronic messages therefrom.

1       10. The telephonic apparatus of claim 3 further  
2 comprising:  
3               a removable data storage means for storing said  
4 electronic messages therein for removably transferring  
5 said electronic messages therefrom.

1       11. The telephonic apparatus of claim 5 further  
2 comprising:  
3               a message full means for terminating a reception of  
4 said electronic messages when said message storage means  
5 reaching a full storage capacity.

1       12. The telephonic apparatus of claim 3 further  
2 comprising:

1       a message screen means for detecting designated  
2       message identifications in said electronic messages for  
3       receiving and storing said electronic messages with said  
4       designated message identifications.

1       13. The telephonic apparatus of claim 3 further  
2       comprising:

3           an automatic logon means for automatically dialing  
4       and logging on a network server periodically for  
5       receiving said electronic messages therefrom.

1       14. The telephone apparatus of claim 4 wherein:  
2           said user interface means further including a  
3       display control means including control buttons for  
4       controlling the display of different electronic  
5       messages.

1       15. A telephonic electronic message apparatus for  
2       automatically receiving electronic messages comprising:  
3           a means for adapting to an existing telephone line  
4       for receiving electronic messages including digitized  
5       signals therefrom;

6           a processing means for automatically responding to  
7       said electronic messages wherein said processing means  
8       further including a message storage means for storing  
9       said electronic messages therein;

10          an user interface means including a display means  
11       for displaying information to an user relating to a  
12       reception of said electronic messages, said user  
13       interface control means further including a display  
14       control means including control buttons for controlling  
15       the display of different electronic messages;

16          a telephone adapting means for connecting to a  
17       telephone;

18          said processing means further including a telephone  
19       interface means for detecting an incoming signal  
20       received from said telephone line and for determining if  
21       said incoming signal being an electronic message and for  
22       transmitting said incoming signal to said telephone when

1        said incoming signal being detected is determined not an  
2        electronic message;  
3                an electronic message exporting means for  
4        delivering said electronic messages via a transmitting  
5        means to a receiving device wherein said electronic  
6        message exporting means including a television interface  
7        means for delivering said electronic messages via said  
8        transmitting means to a television for displaying said  
9        electronic messages thereon;  
10              said user interface means further including an  
11        message exporting control means for controlling a  
12        display of said electronic message on said television;  
13              an automatic registration means for storing  
14        required registration data therein and for automatically  
15        dialing and registering with a network server for  
16        receiving said electronic messages therefrom; and  
17              a message full means for terminating a reception of  
18        said electronic messages when said message storage means  
19        reaching a full storage capacity.

1        16. The telephonic apparatus of claim 15 further  
2        comprising:  
3              a message screen means for detecting designated  
4        message identifications in said electronic messages for  
5        receiving and storing said electronic messages with said  
6        designated message identifications.

1        17. The telephonic apparatus of claim 16 further  
2        comprising:  
3              a removable data storage means for storing said  
4        electronic messages therein for removably transferring  
5        said electronic messages therefrom.

1        18. The telephonic apparatus of claim 15 further  
2        comprising:  
3              an automatic logon means for automatically dialing  
4        and logging on a network server periodically for  
5        receiving said electronic messages therefrom.

1       19. The telephonic apparatus of claim 15 wherein:  
2                 said telephonic apparatus being provided for  
3             receiving a plurality of message units; and  
4                 said user interface means including a message unit  
5             access Control means for controlling an access to each  
6             of said plurality of message units.

1       20. A method for providing communication between a  
2             local electronic message server and a telephone user  
3             connected with telephone line to the server comprising  
4             the steps of:

5                 (a) providing a telephonic electronic message  
6             apparatus (which including a means for adapting)  
7             adaptable to said telephone line for receiving  
8             electronic messages from said local server; and  
9                 (b) providing a processing means for said  
10            telephonic electronic message apparatus for  
11            automatically receiving electronic messages for storing  
12            said messages therein whereby said electronic messages  
13            may be received and stored without requiring a human  
14            operation.

1       21. An electronic message communication system  
2             comprising:

3                 a local electronic message server connected to an  
4             internet system for receiving said electronic messages  
5             therefrom and sending said electronic messages thereto;  
6                 a telephonic electronic message apparatus connected  
7             to said local electronic message server by a telephone  
8             line wherein said telephonic electronic message  
9             apparatus includes a means for adapting to said  
10            telephone line; and

11                 said telephonic electronic message apparatus  
12            further includes a processing means for automatically  
13            receiving said electronic messages transmitting from  
14            said local server through said telephone line for  
15            storing said messages in said telephonic electronic  
16            message apparatus whereby said electronic messages may  
17            be received and stored without requiring a human

1       operation.

1       22. The electronic message communication system of  
2       claim 21 wherein:

3                 said telephonic electronic message apparatus  
4       includes a registration trigger means and an automatic  
5       registration dial-up means for automatically sending a  
6       plurality of identification messages to said local  
7       server for registration upon an actuation of said  
8       registration trigger means; and

9                 said local electronic message server includes a  
10      registration processing means for receiving said  
11      plurality of identification messages for processing a  
12      registration of said telephonic electronic message  
13      apparatus in said local server.

1       23. The electronic message communication system of  
2       claim 21 wherein:

3                 said telephonic electronic message apparatus  
4       includes an auto collect triggering means and an collect  
5       dial-up means for automatically sending a plurality of  
6       auto collect messages to said local server upon an  
7       actuation of said auto collect trigger means; and

8                 said local electronic message server includes an  
9       auto collect processing means for receiving and  
10      responding to said plurality of auto collect messages  
11      for automatically sending a plurality of electronic  
12      messages to said telephonic electronic message  
13      apparatus.

1       24. The electronic message communication system of  
2       claim 21 wherein:

3                 said local electronic message server includes an  
4       message priority processing means for checking a  
5       priority of each of said electronic messages and for  
6       sending each of said electronic messages to said  
7       telephonic electronic message apparatus according to  
8       said priority.

1       25. The electronic message communication system of  
2       claim 21 wherein:

3            said local electronic message server includes a  
4       storage capacity processing means for checking a storage  
5       capacity of said telephonic electronic message apparatus  
6       and for sending said electronic messages thereto  
7       according to said storage capacity whereby a message  
8       overflow of said telephonic electronic messages  
9       apparatus may be prevented.

1       26. The electronic message communication system of  
2       claim 22 wherein:

3            said automatic registration dial-up means provided  
4       for automatically sending a plurality of said  
5       identification messages including a telephone number, a  
6       machine number and a user password.

1       27. A method for sending and receiving electronic mail  
2       messages over an interconnected network of computers  
3       where one of said interconnected computers is configured  
4       to receive mail messages having a particular domain  
5       address, said configured computer electronically  
6       connected to one or more mail servers each designated  
7       for a particular geographical region and each  
8       electronically connected to one or more electronic mail  
9       messaging devices each having a particular address  
10      within said domain address for receiving electronic mail  
11      messages addressed to said particular address, wherein  
12      each of said devices contains dedicated electronic  
13      circuitries for sending, receiving, and storing  
14      electronic mail messages, said method comprising the  
15      steps of:

16           receiving one or more electronic mail messages each  
17       addressed to a particular address within said domain  
18       address;

19           determining the mail server for delivering each of  
20       the electronic mail messages in accordance to their  
21       respective particular addresses;

22           packaging the electronic mail messages for a mail

1       server into a mailbag for delivery;  
2            sending said mailbag to said mail server;  
3            unpackaging said mailbag and reconstructing the  
4        electronic mail messages from said mailbag at said mail  
5        server; and  
6            delivering each of the electronic mail messages to  
7        the corresponding electronic mail messaging devices.

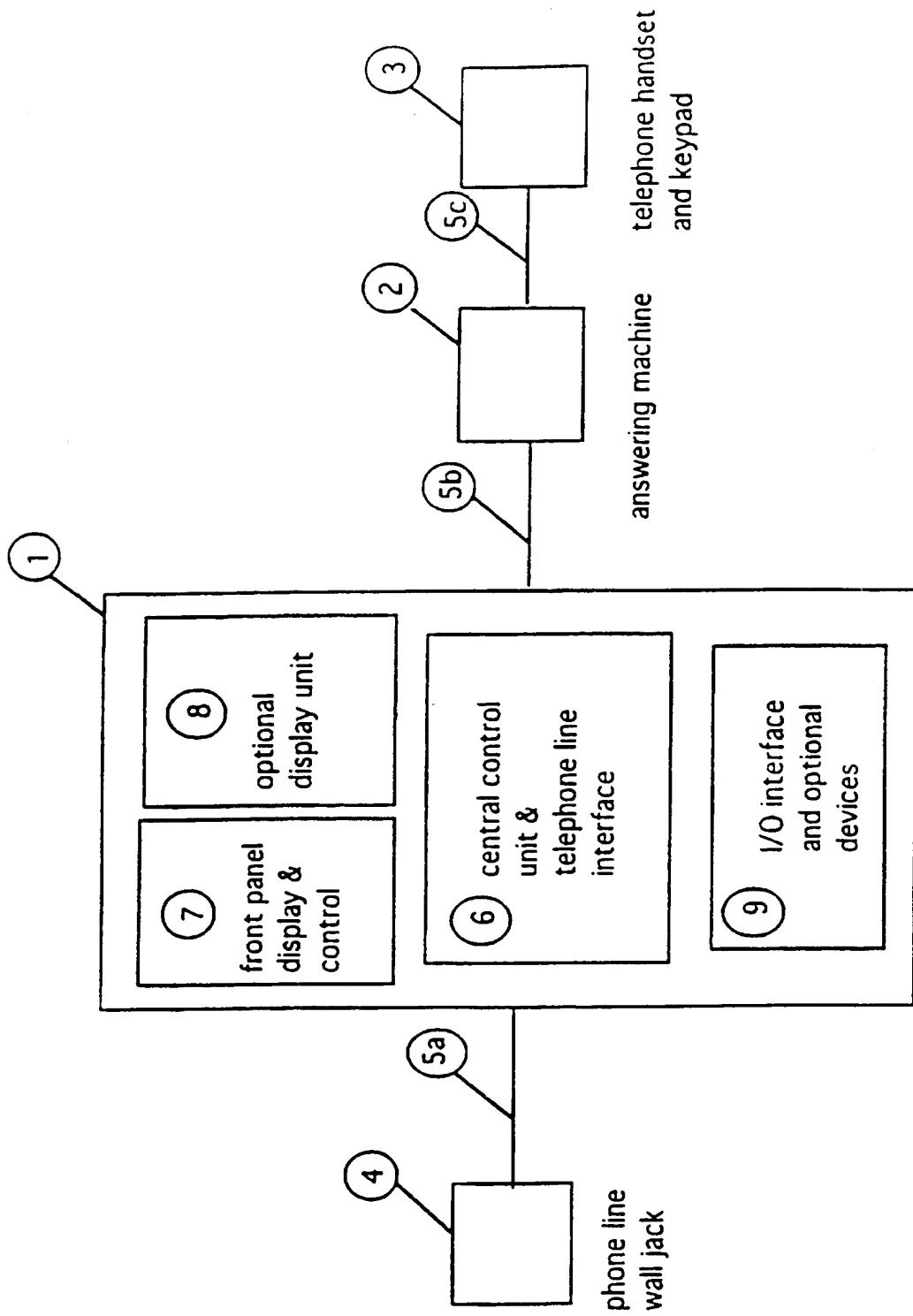


Fig. 1 connection of E-mail apparatus and telephone & answering machine

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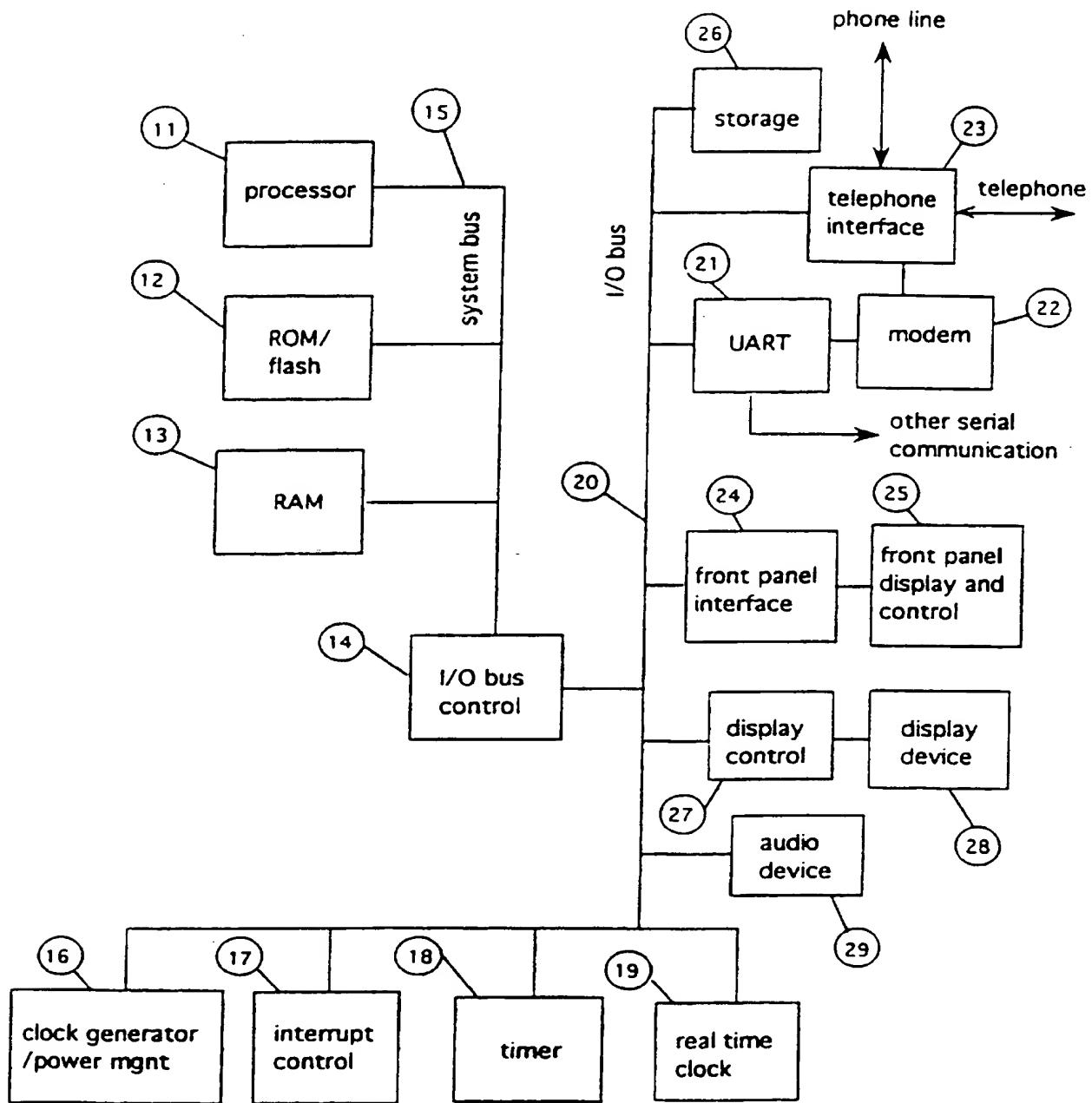


Fig 2. Block diagram of the E-mail apparatus

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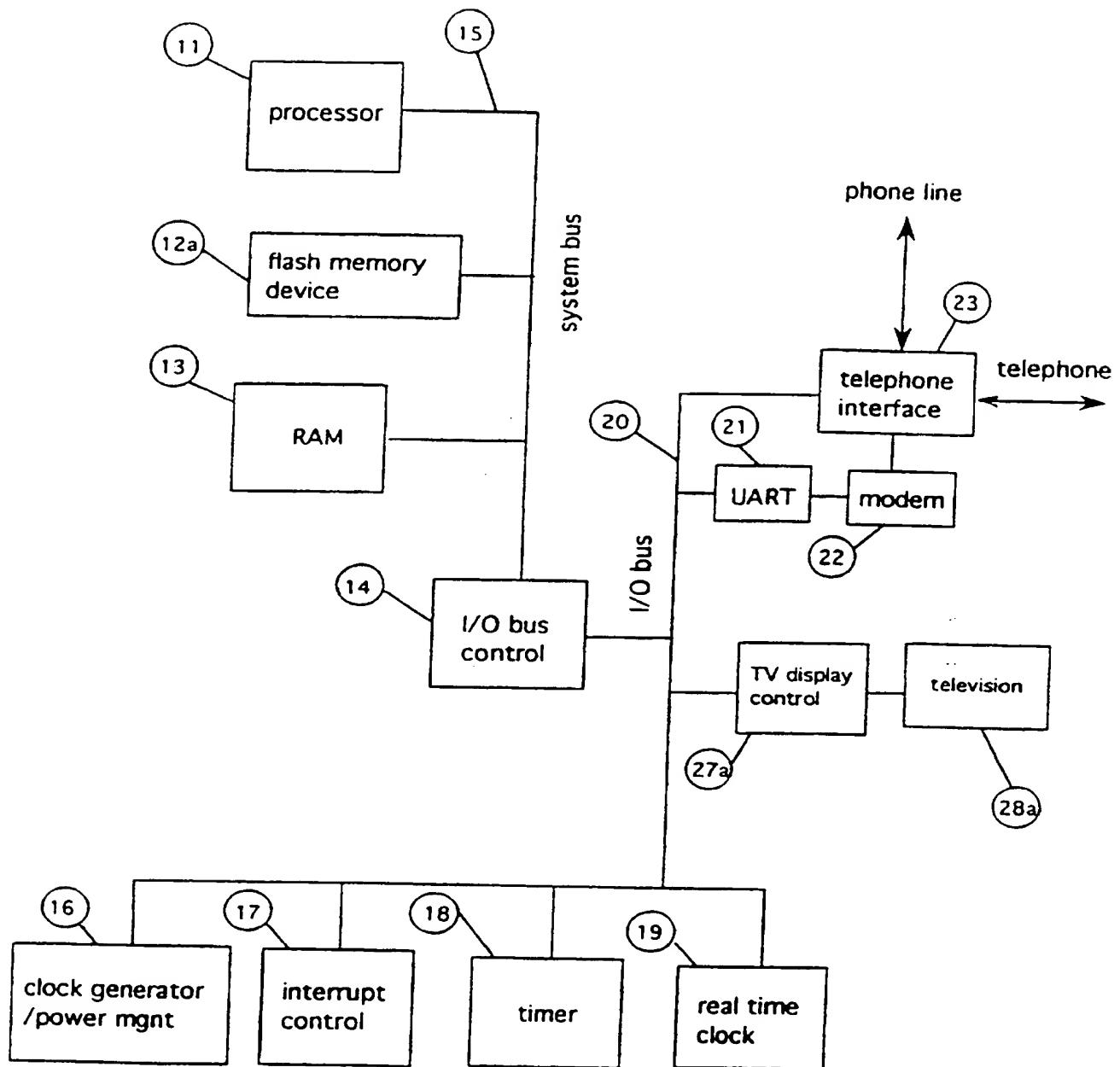


Fig 2a. Example of the E-mail apparatus implementaiton

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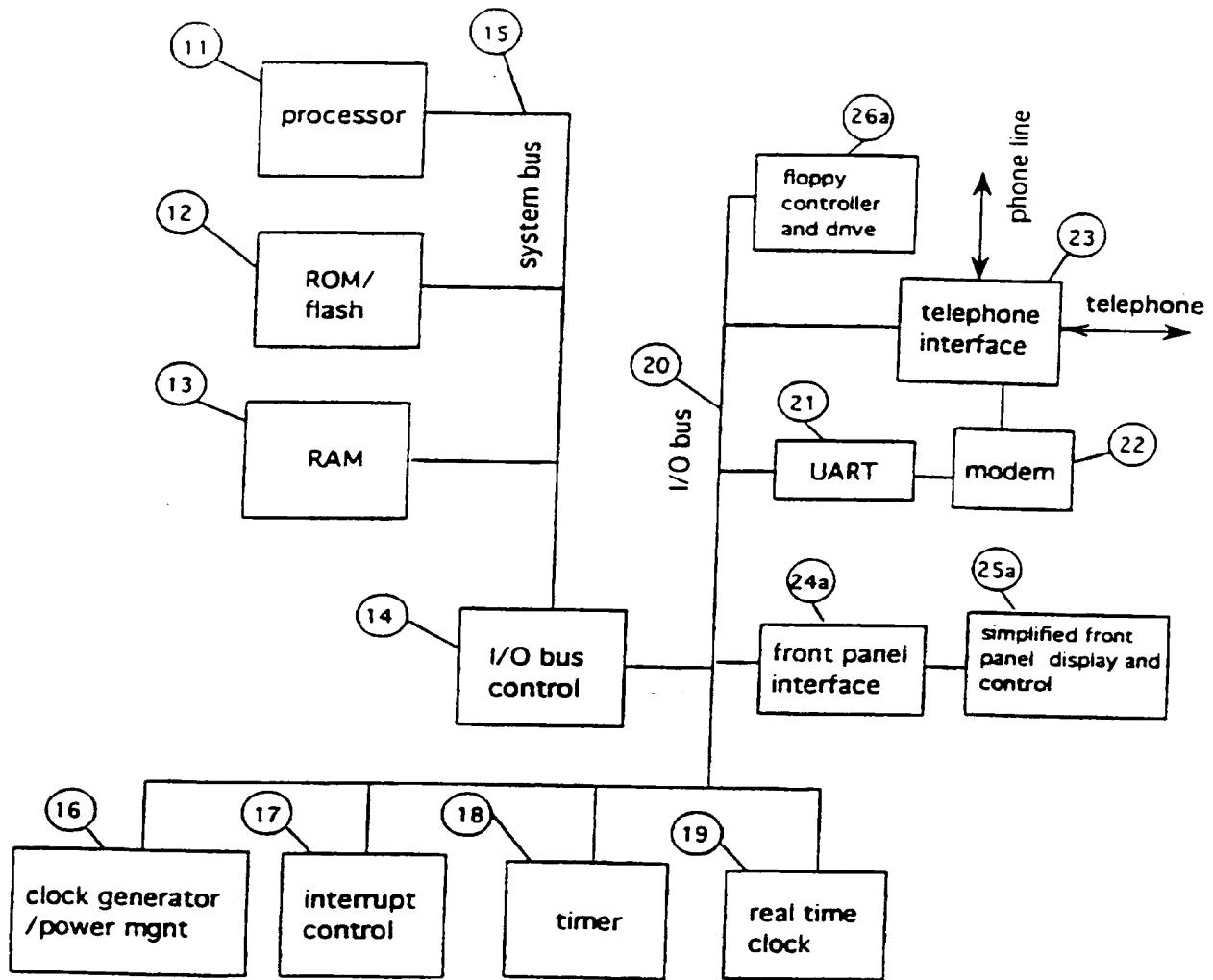


Fig 2b. Example of the E-mail apparatus implementation

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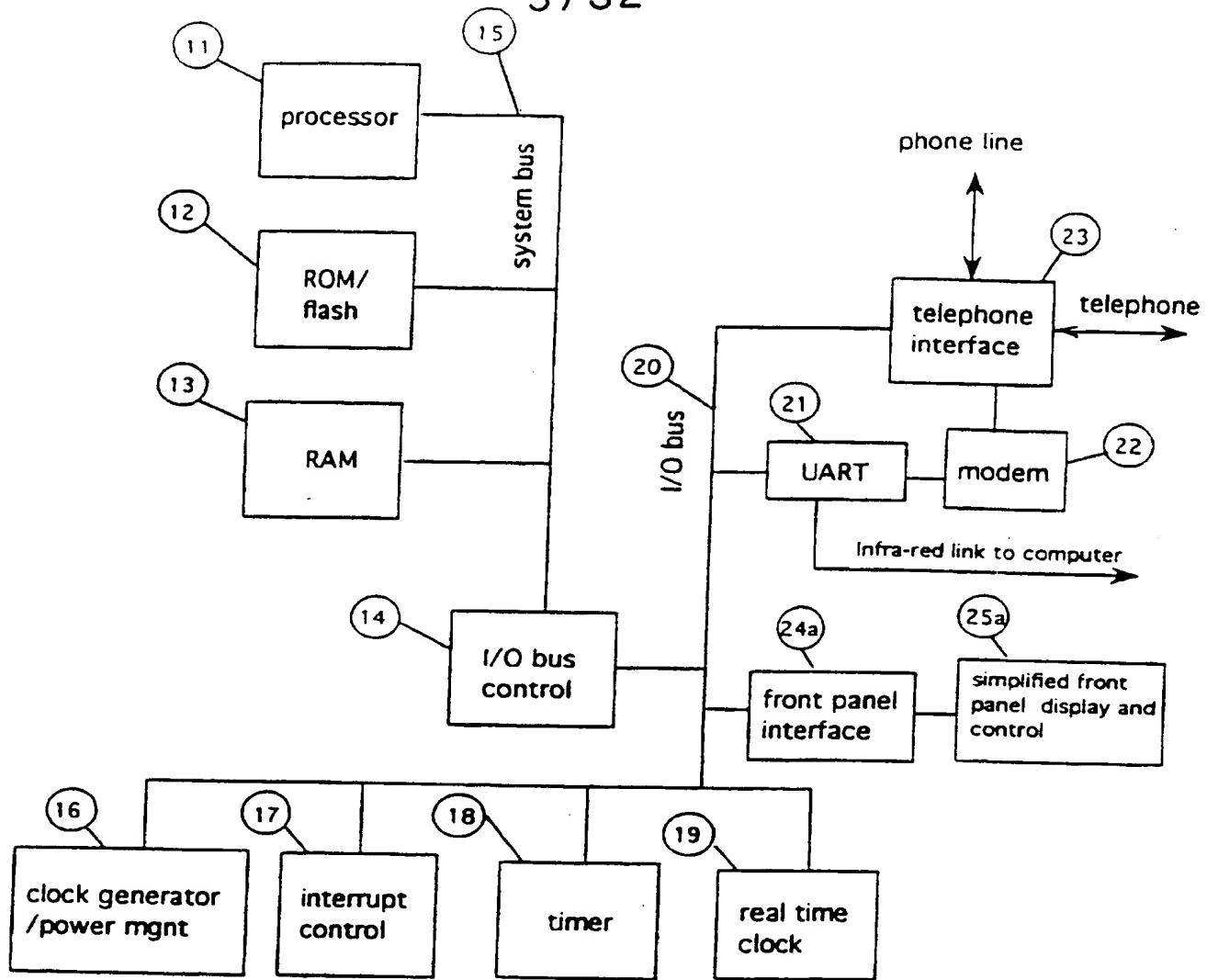


Fig 2c. Example of the E-mail apparatus implementation

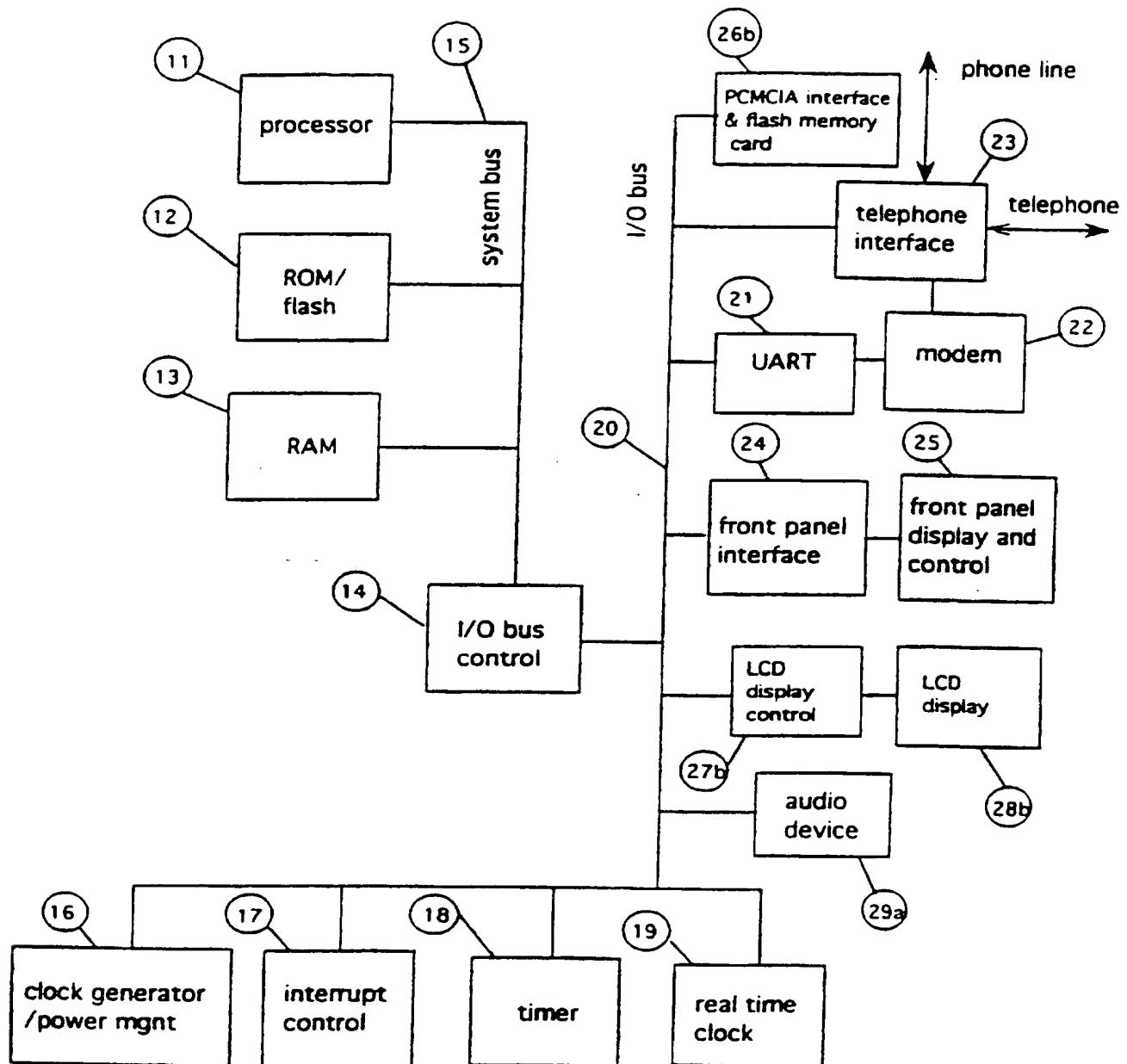


Fig 2d. Example of the E-mail apparatus implementation

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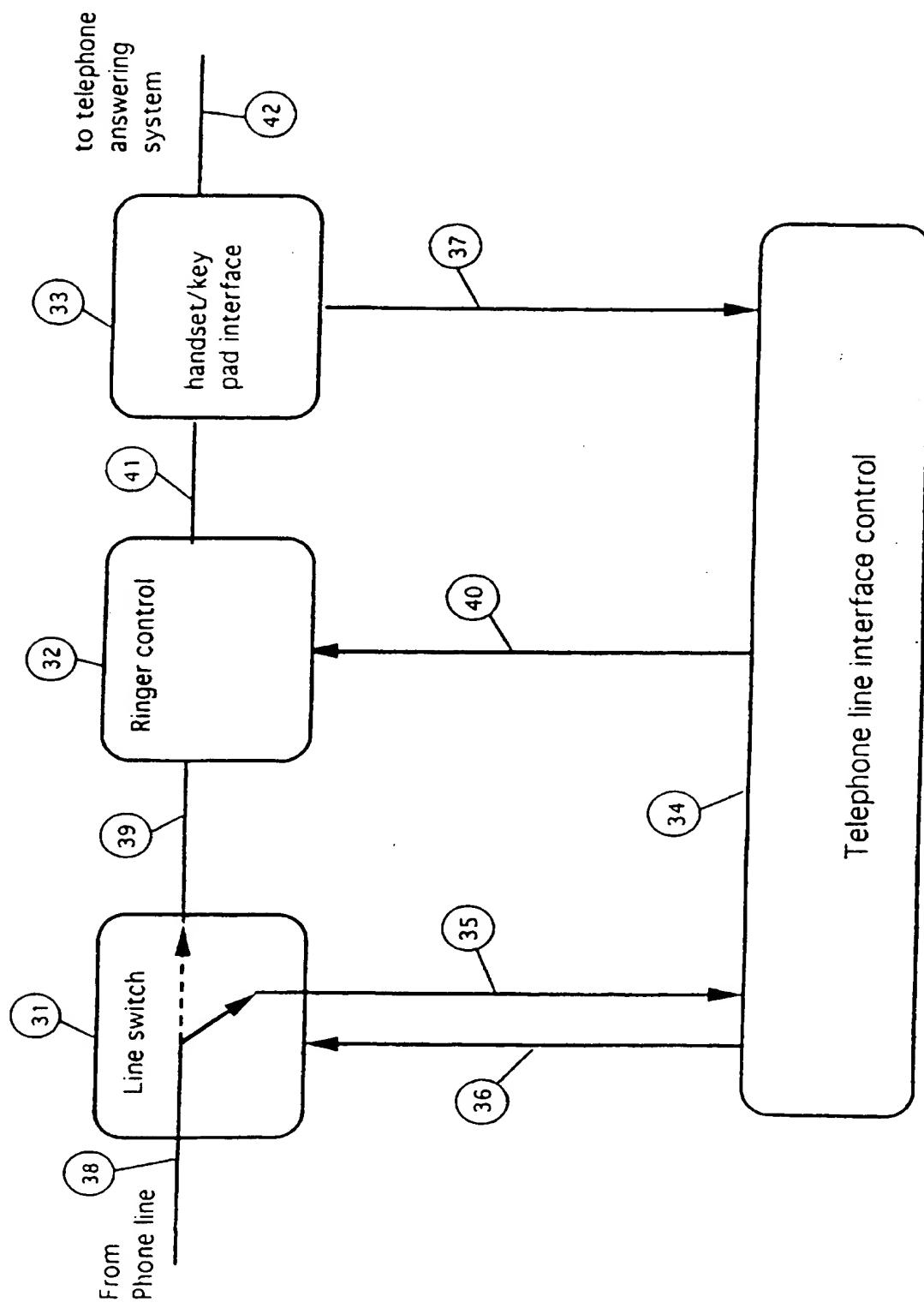


Fig. 3 Telephone interface block diagram

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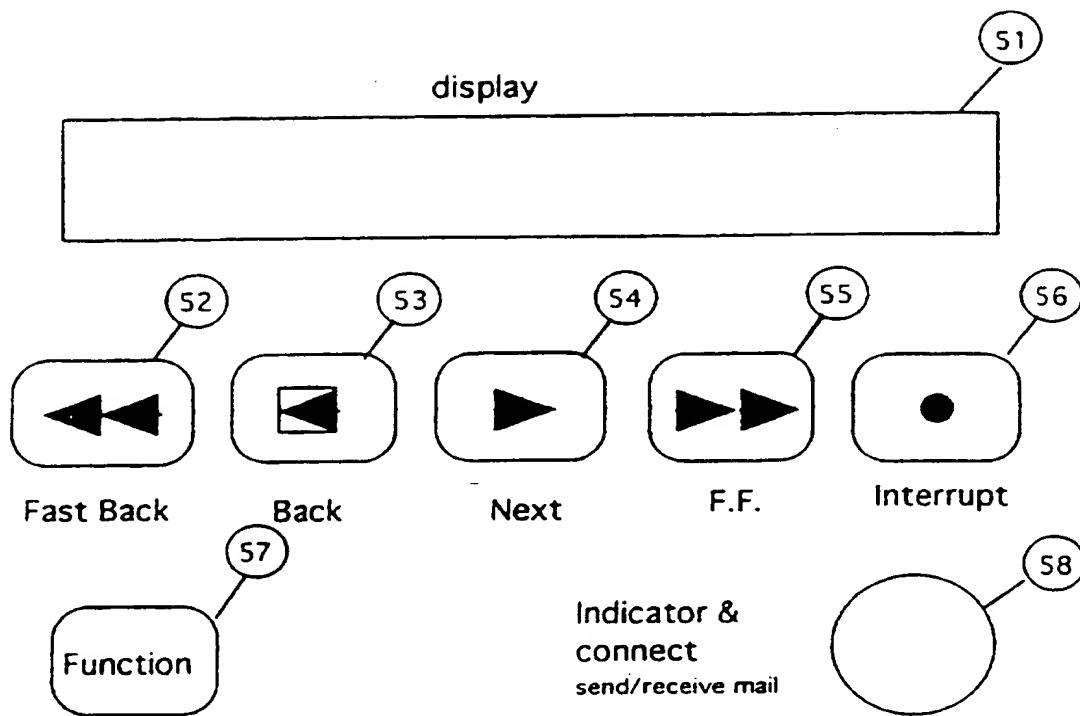


Figure 4: Front panel interface

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### Special functions

- 1. registration
- 2. set current time
- 3. set personal code (p code)
- 4. change the number to dial
- 5. Hold mail
- 6. Forward mail
- 7. Auto-dial time
- 8. data import/export
- 9. display E-mail address
- 10. change E-mail address
- 11. Self-test

**Figure 5: Example of special functions menu**

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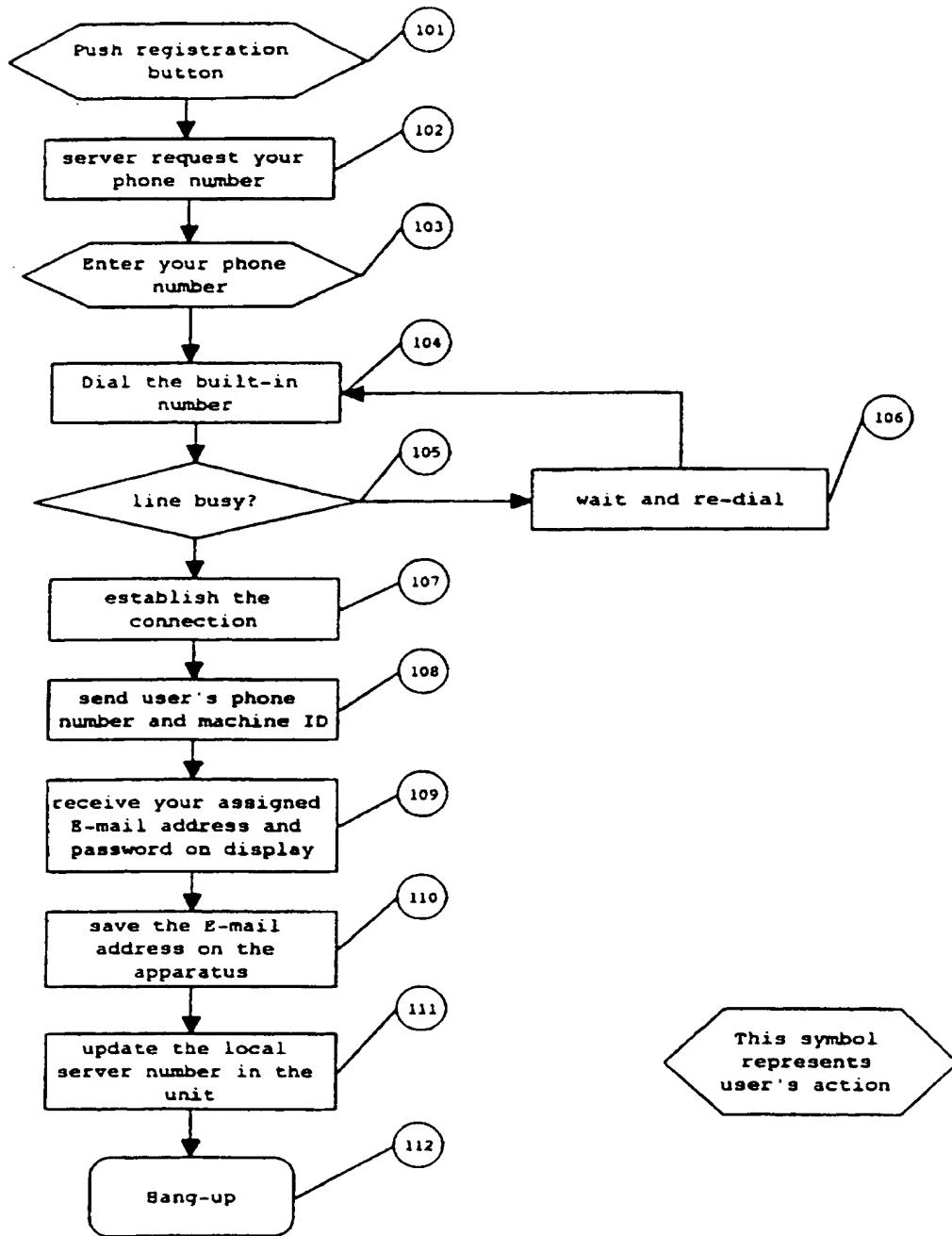


Figure 6: Easy registration flow

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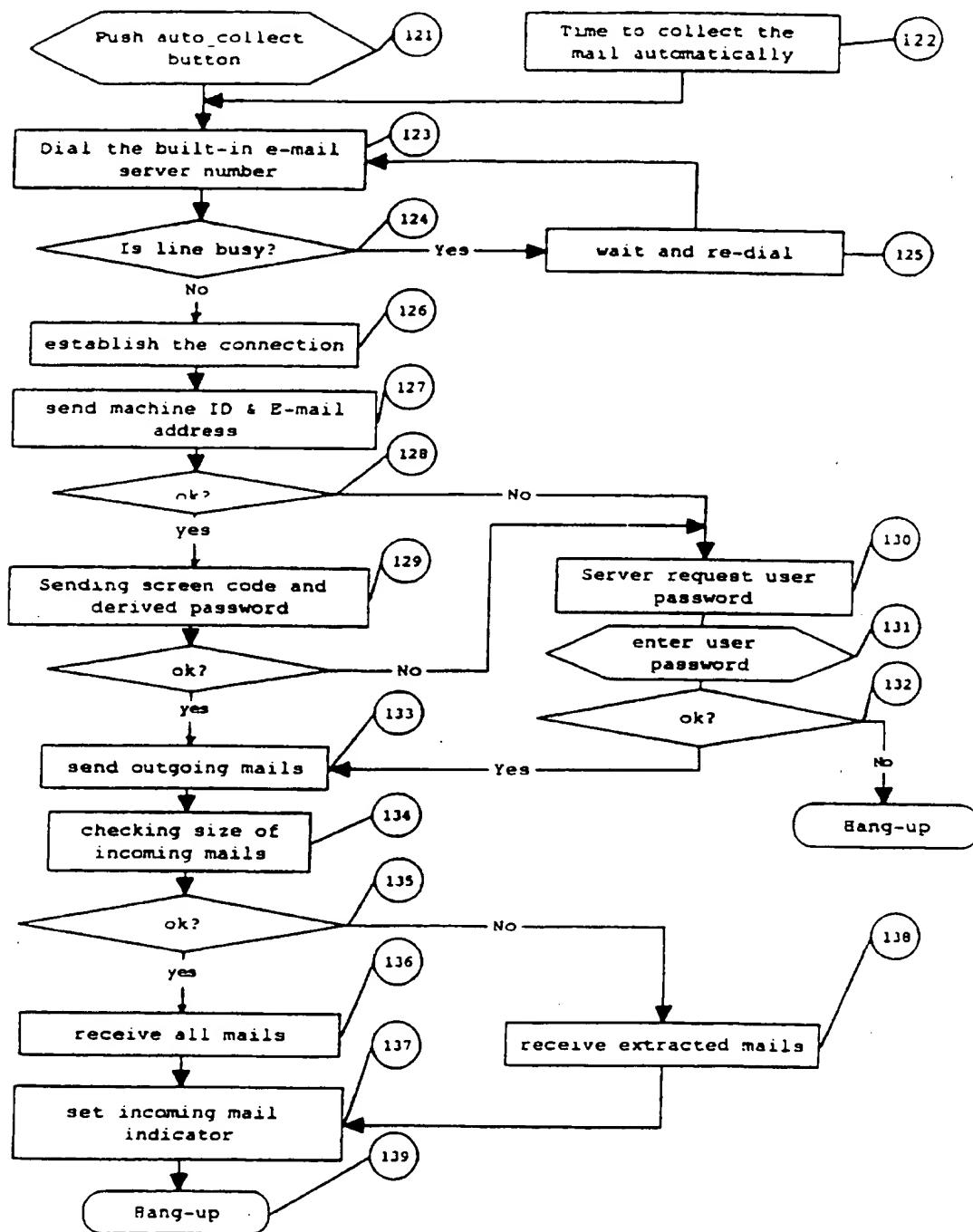


Figure 7: E-mail collect flow

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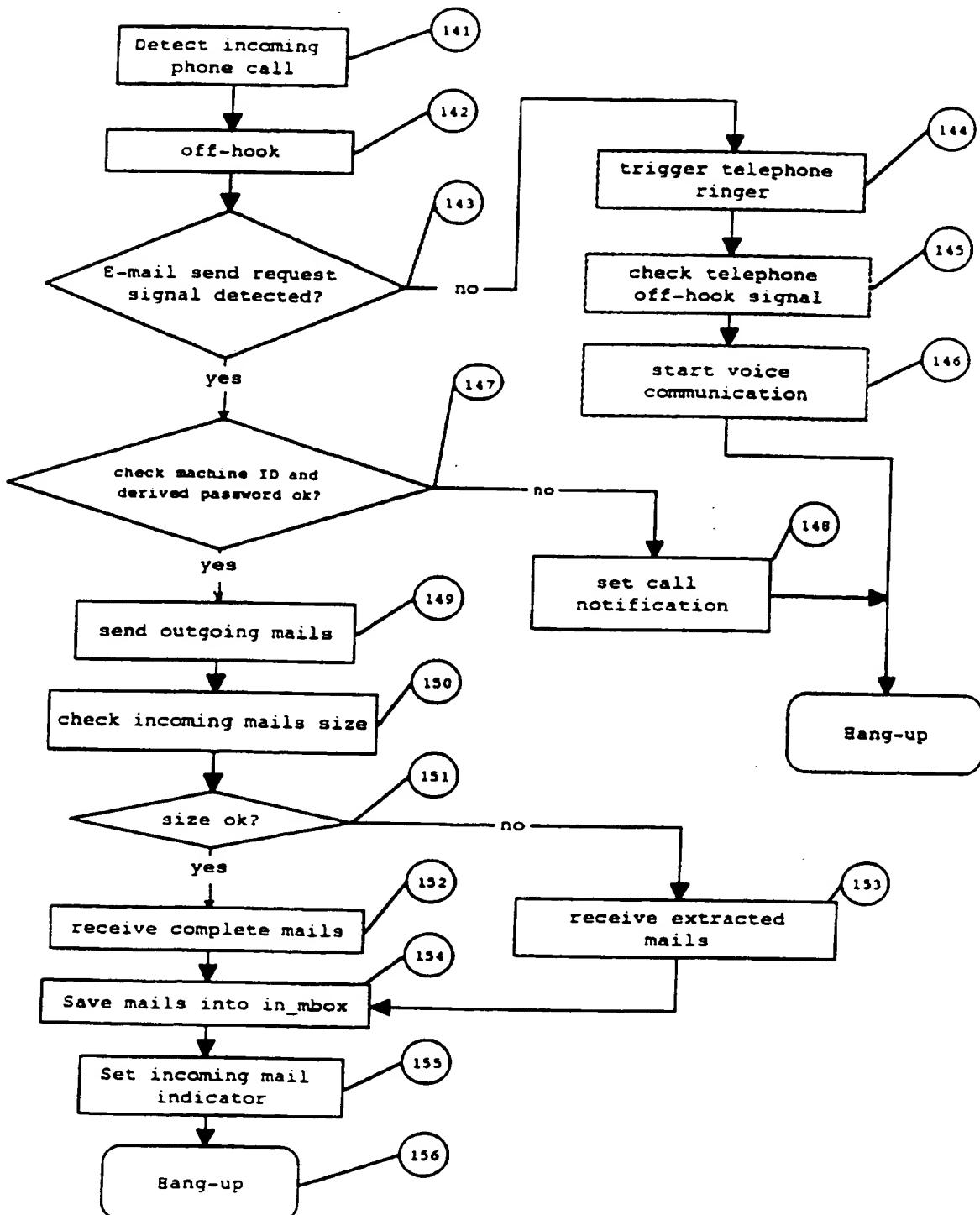


Figure 8: Apparatus's response to E-mail server

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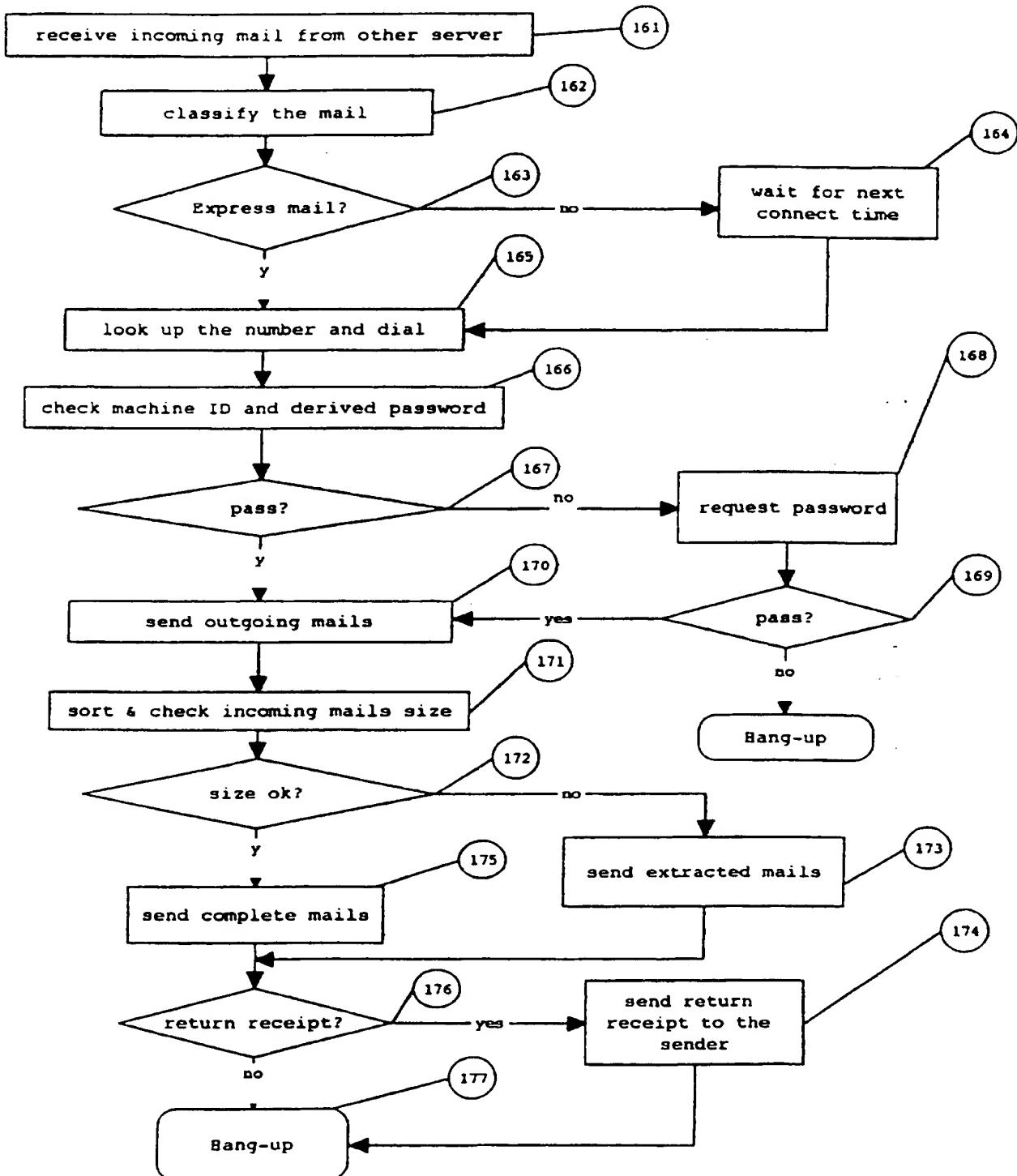


Figure 9:E-mail server mail process flow

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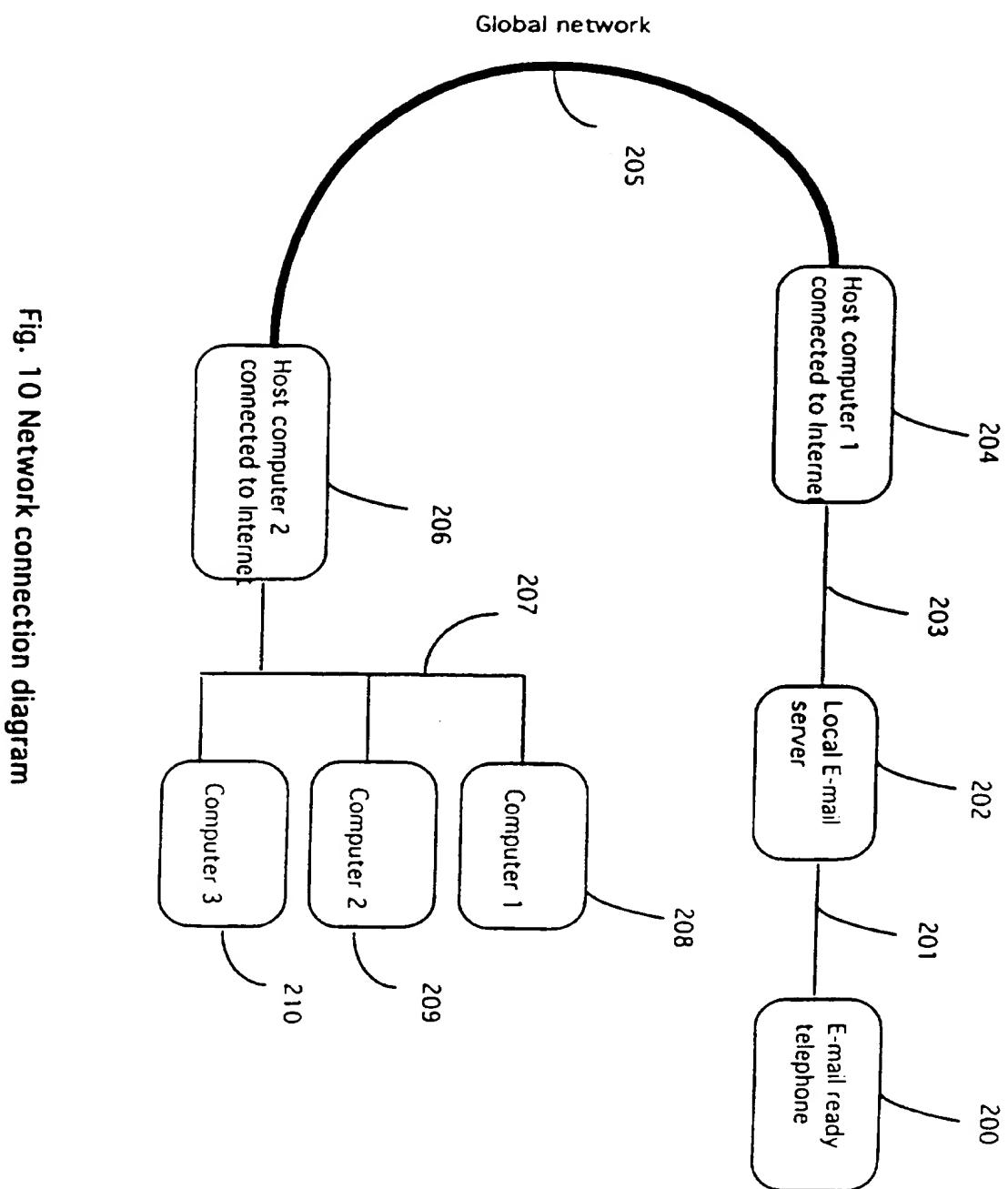


Fig. 10 Network connection diagram

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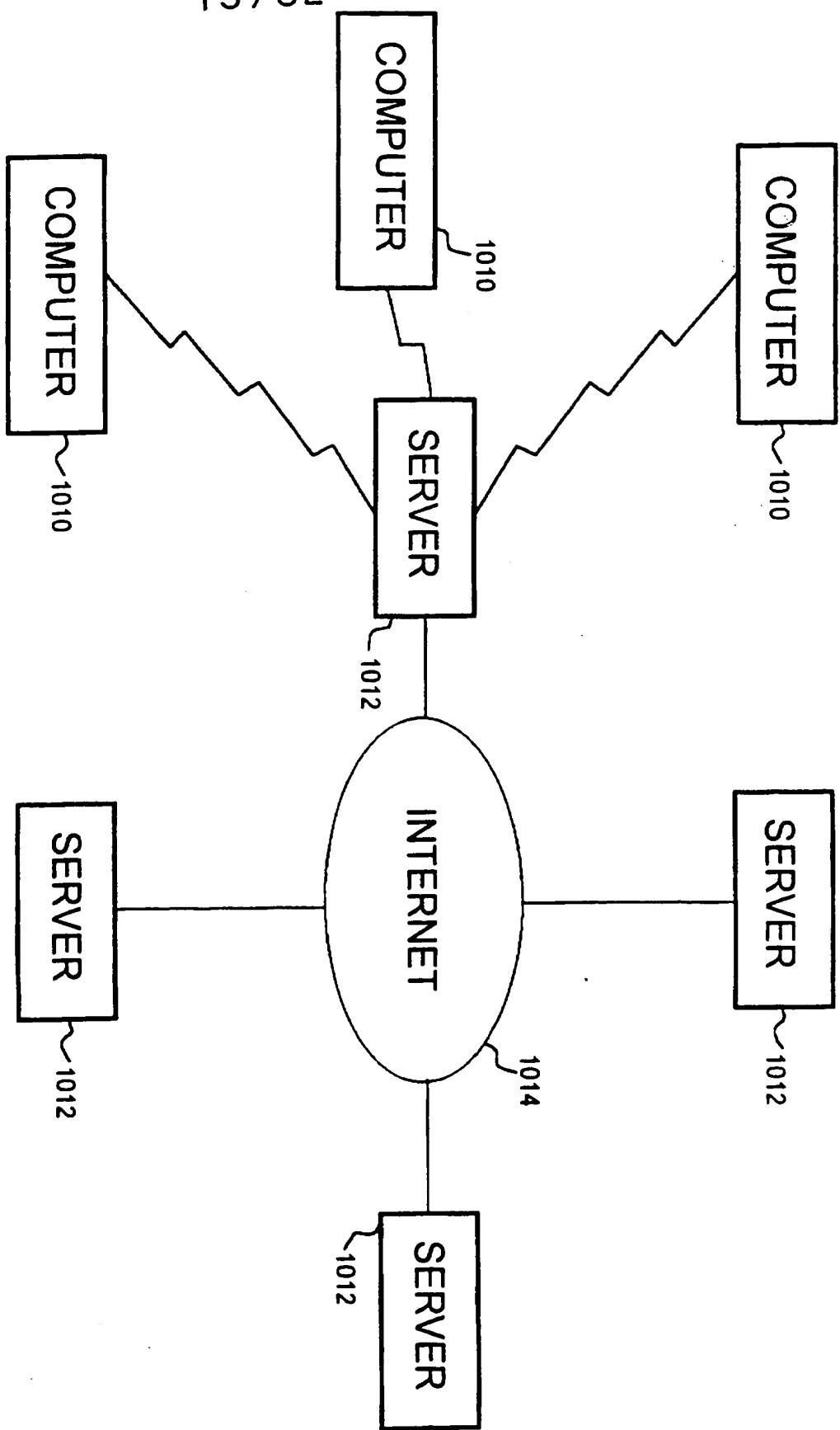


Fig. 11

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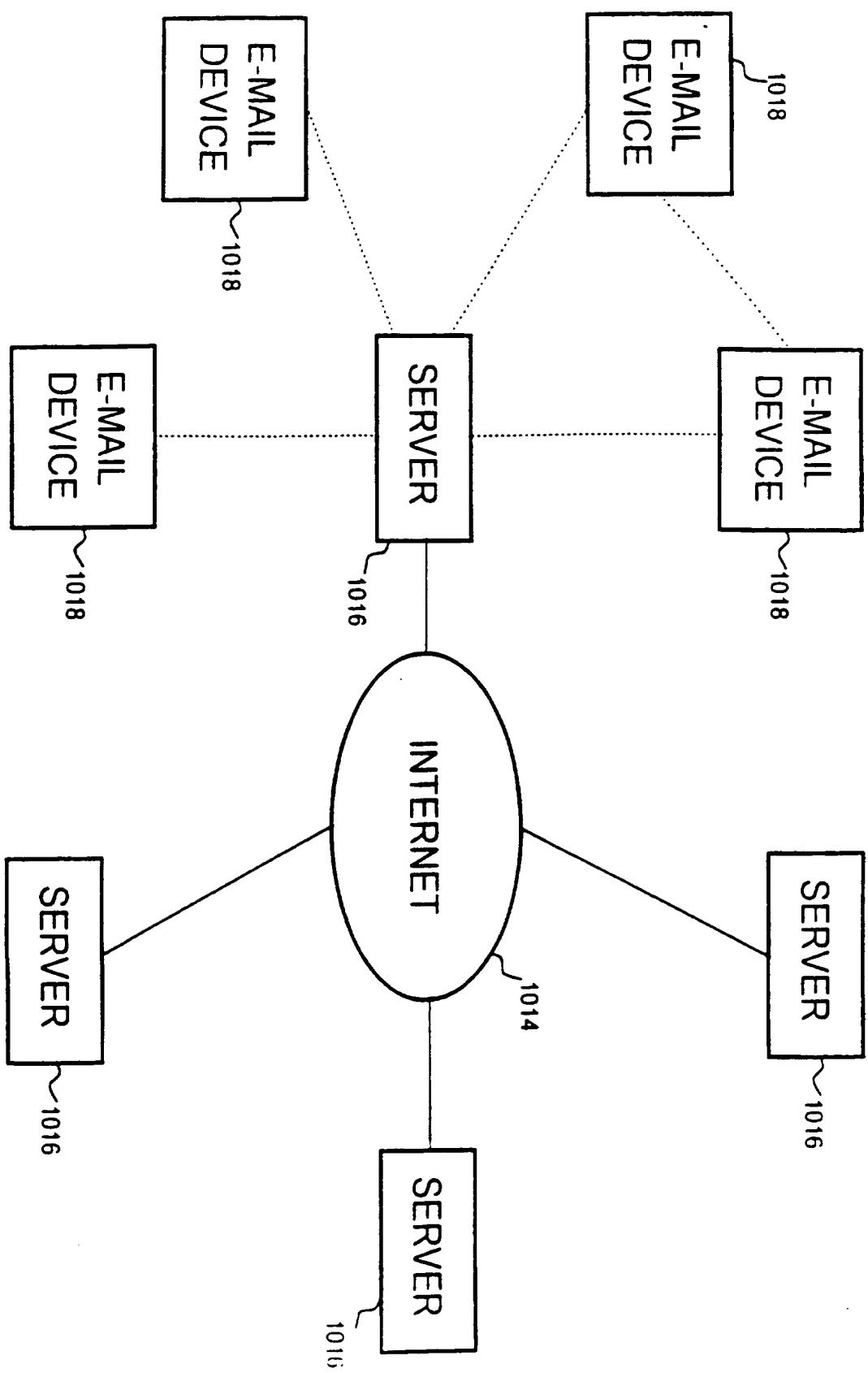


Fig. 12

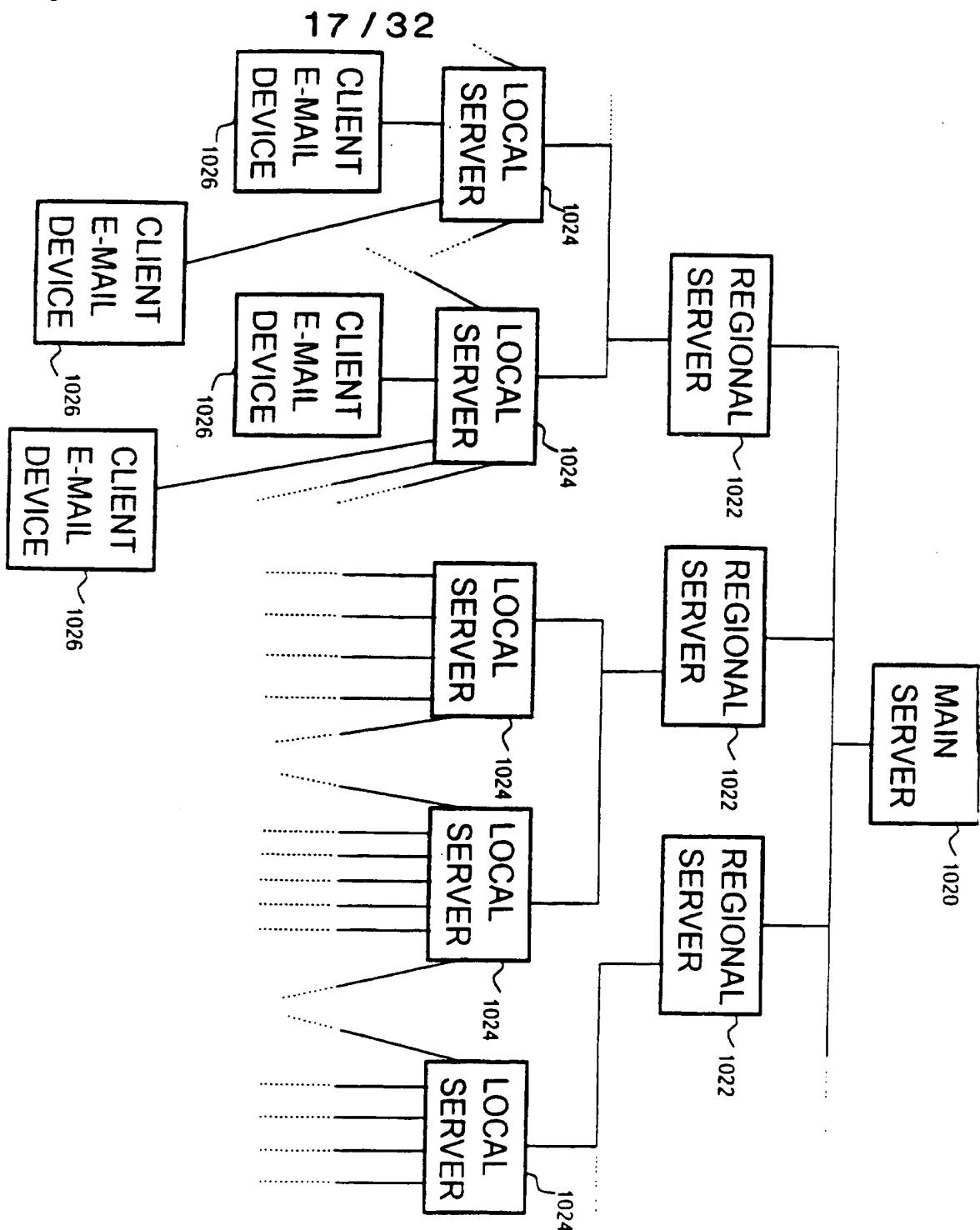


Fig. 13

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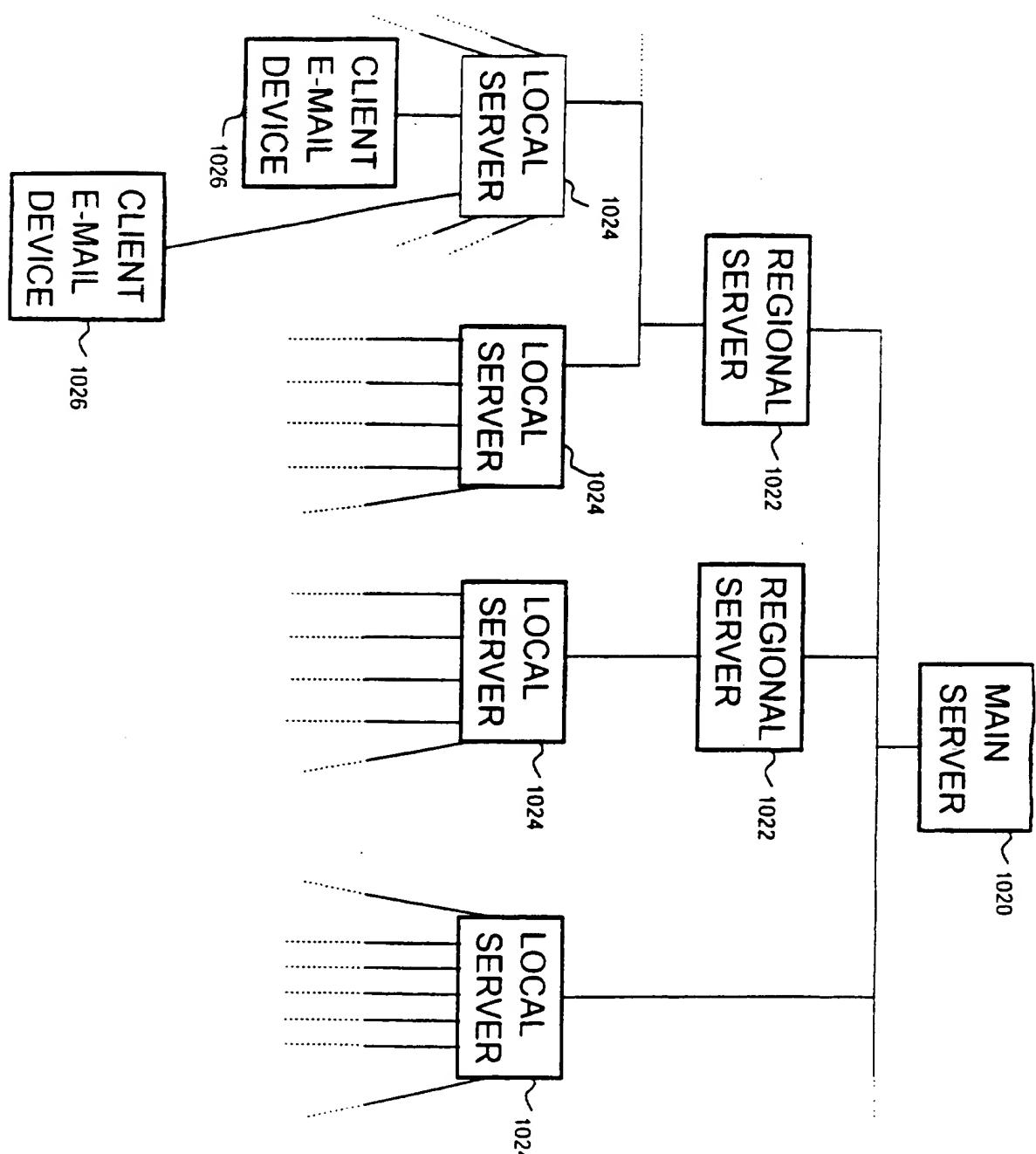


Fig. 14

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Fig. 15

Registration Process:

- get machine ID
- get security code
- get notification code from e-mail device
- get phone number for e-mail device
- search for the phone number of the corresponding local server
- send local server phone number to e-mail device
- update tables for this client

Fig. 16a

Main\_Mail\_Process:

- Every x minutes
- Process\_Incoming\_Mail
- Process\_Outgoing\_Mail

Fig. 16b

Process\_Outgoing\_Mail:

- check for new outgoing mail every y minute
- if new outgoing mail found,
  - for each outgoing mailbag
  - decompress mailbag
  - extract outgoing mail messages
  - pass out outgoing messages
  - to send mail utility

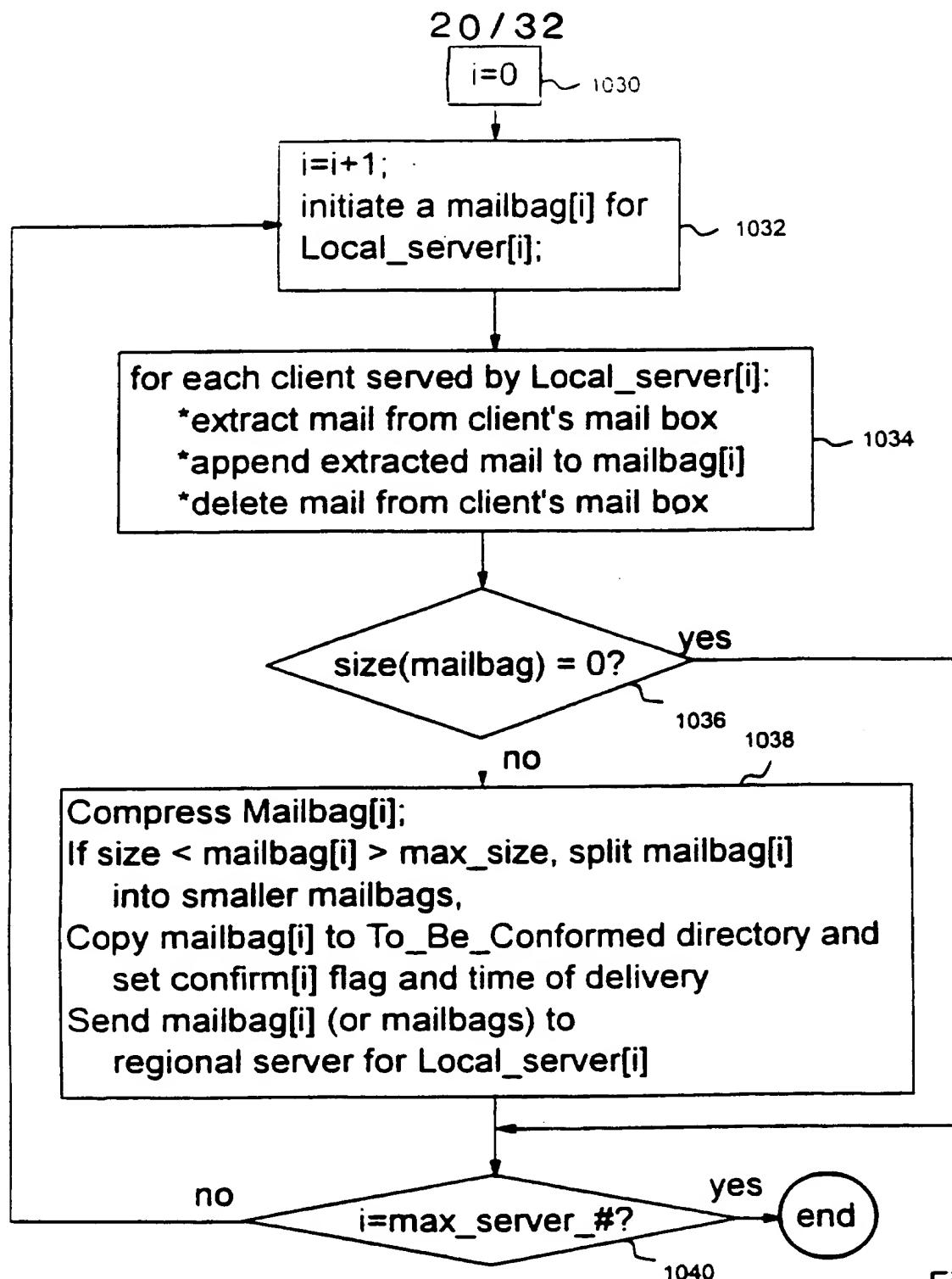


Fig. 16c

```
Confirm_process:  
Every w minutes  
    for each confirm[i]=true  
        search confirmation mail message from local server[i];  
        if confirmation found  
            if not all mail message in mailbag[i]  
                are delivered  
                if elapsed time > max_elapse_time,  
                    extract and place undelivered  
                        mail message in delivery_failed  
                        directory;  
                        notify operator;  
                if confirmation not found and  
                    elapse time > max_elapse_time;  
                        notify operator;
```

Fig. 16d

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Fig. 17a

```
Every x minutes
  get mailbag from regional server
  decompress mailbag
  extract mail message from mailbag
  identify & place mail into recipient clients'
    m_box
```

Fig. 17b

```
Every x minutes
  For each client[i]
    if client[i], m_box is not empty
      case(notification method):
        notify_only:
          notify_process;
        call_back_mail_delivery:
          call_back_mail_delivery;
        direct_mail_delivery:
          direct_mail_delivery;
      end
```

Fig. 17c

```
Notify_process:
  get last_logon_time of client[i]
  check_new_mail for client[i]
  if no new mail, or if notification has been sent already, exit;
  else
    label1: call (client[i] phone number)
      if busy; wait x minutes and goto label 1;
    detect_ring_tone for client[i]. x1 second & disconnect;
    wait w1 second;
    call (client[i] phone number); if busy; wait x minute and goto label 1;
    detect_ring_tone for client[i]. x2 second & disconnect;
    wait w2 second;
    call (client[i] phone number); if busy; wait x minute and goto label 1;
    detect_ring_tone for client[i]. x3 second & disconnect;
```

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Fig. 17d

```

Call_Back_Mail_Delivery:
try_counter=0;
label 2: Notify_Process;
Set AutoAnswer for x period of time
If client calls back within x period of time
Begin
    Handshake;
    Exchange_Mail_File;
    Disconnect;
    Send_Confirmation_To_Server;
    Send_Outgoing_Mail_To_Server;
end
Else
    If try_counter > max_try
        Report error to server
    Else increment try_counter
        goto label 2
end

```

Fig. 17e

```

Direct_Mail_Delivery:
Try_counter=0
label 3: Call Client
If no response from E-mail device
    increment try_counter
    If try_counter > max_try
        report error to server
    Else
        goto label 3
end
Else
    Handshake;
    Exchange_Mail_File;
    Disconnect;
    Send_Confirmation_To_Server;
    Send_Outgoing_Mail_To_Server;
end

```

Fig. 17f

```
Handshaking:  
  Check security code  
  If security code incorrect  
    disconnect;  
    report unmatched security code to server  
  Else  
    Check machine ID  
    If machine ID incorrect  
      disconnect;  
      report unmatched machine ID to server;  
    end
```

Fig. 17g

```
Exchange_Mail_Files:  
  Retrieve outgoing mail from client e-mail device;  
  Get available storage size on e-mail device;  
  If incoming mail message > available storage size  
    Repackage_Mail_Messages;  
    Send incoming mail to e-mail device;  
    Disconnect;
```

Fig. 17h

```
Repackage_Mail_Messages:  
  Sort incoming mail in order of priority  
  Select mail in order of priority up to available storage  
    size and leave space for a system mail message  
    indicating more mail messgae at the local server
```

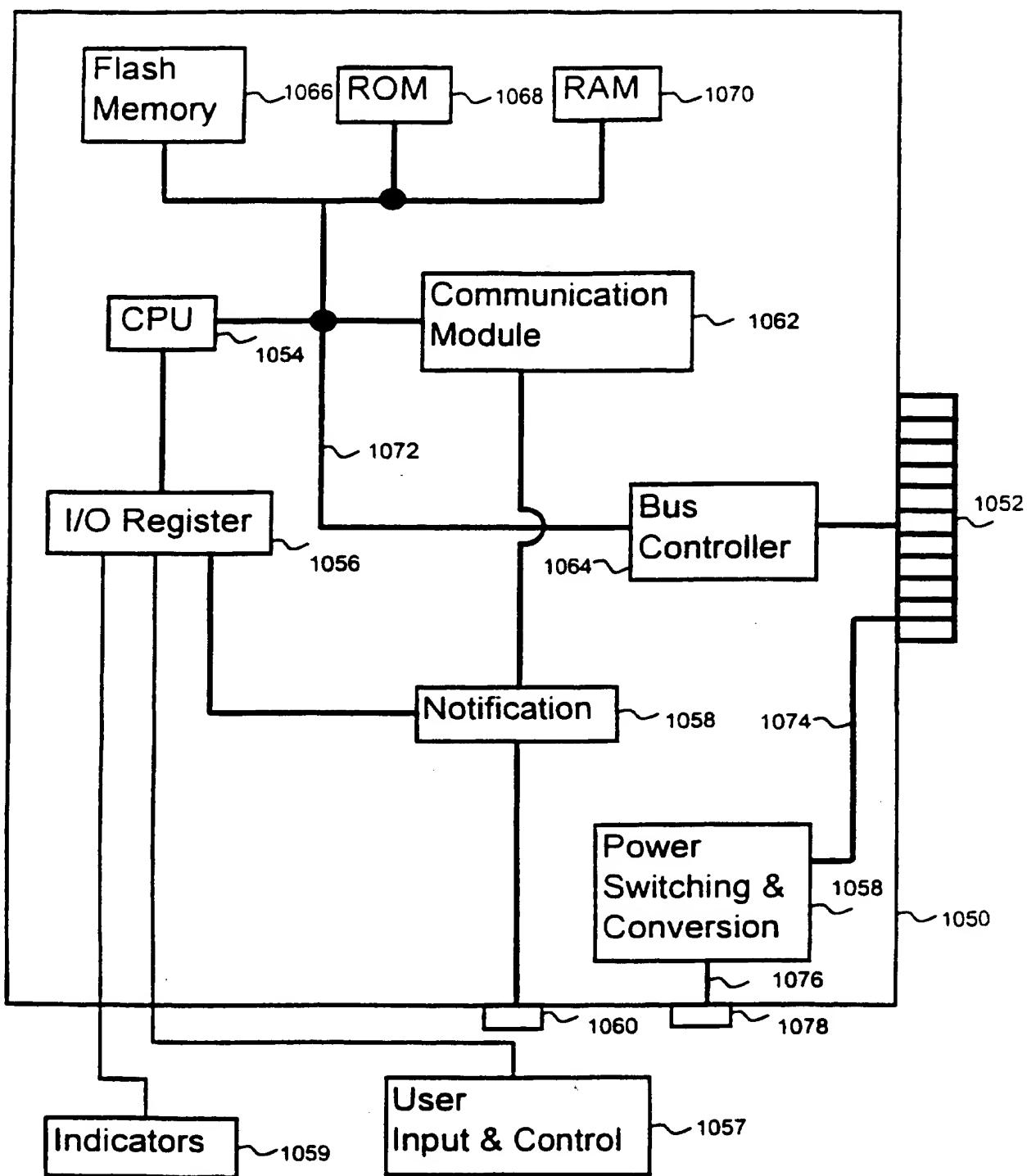


Fig. 18a

Fig. 18b

```
procedure Get_mail;
    check_card_status
    if busy wait                                // wait until it is not busy
    else
        begin
            check_inmail
            if not empty move the mail to host
            empty the inbox on card
            display_mail
        end
```

Fig. 18c

```
procedure Send_mail;
    check_card_status
    if busy wait                                // wait until it is not busy
    else
        begin
            check_outmail_space
            if space available, move the mail to card
            done
        end
```

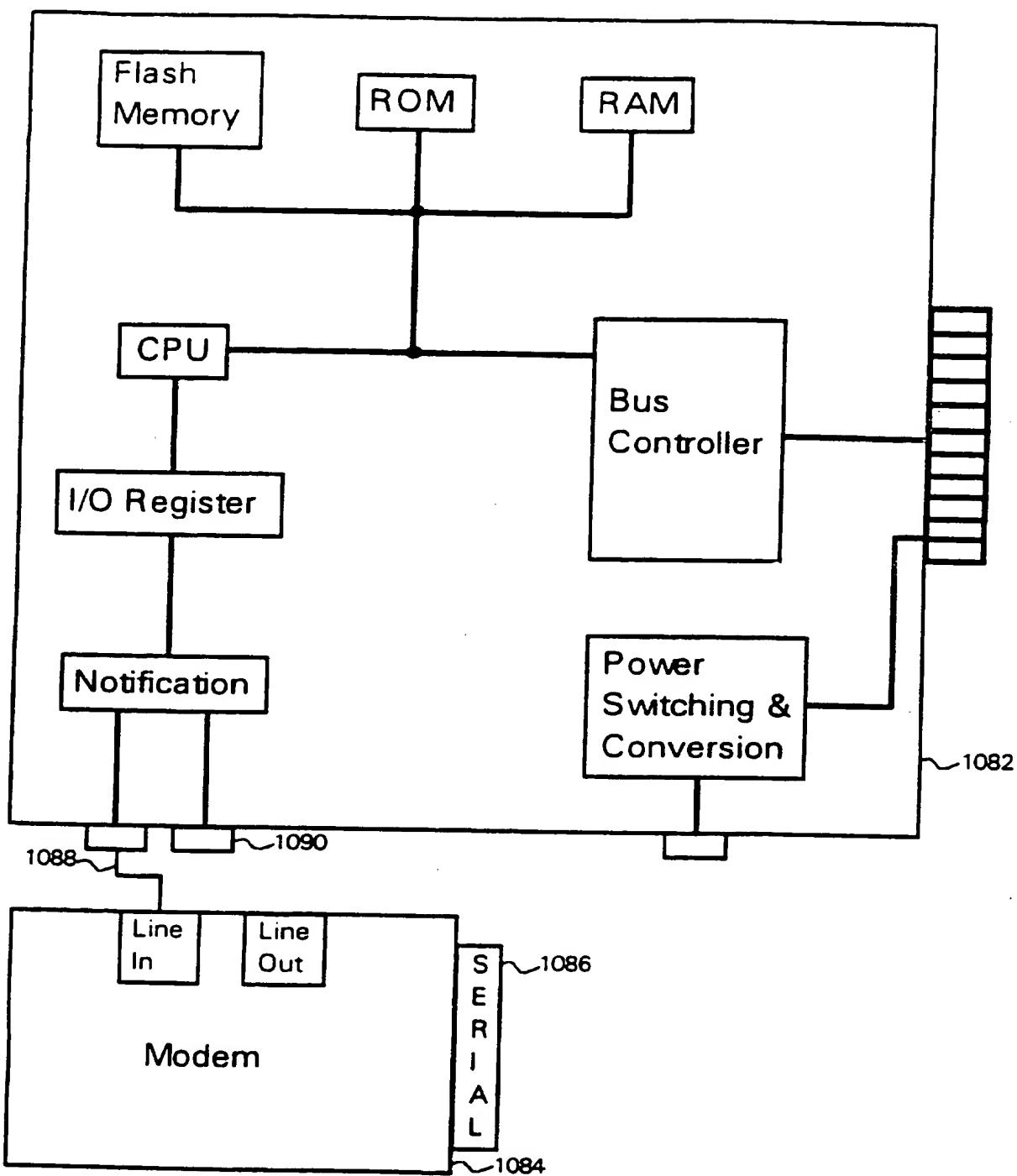


Fig. 19a

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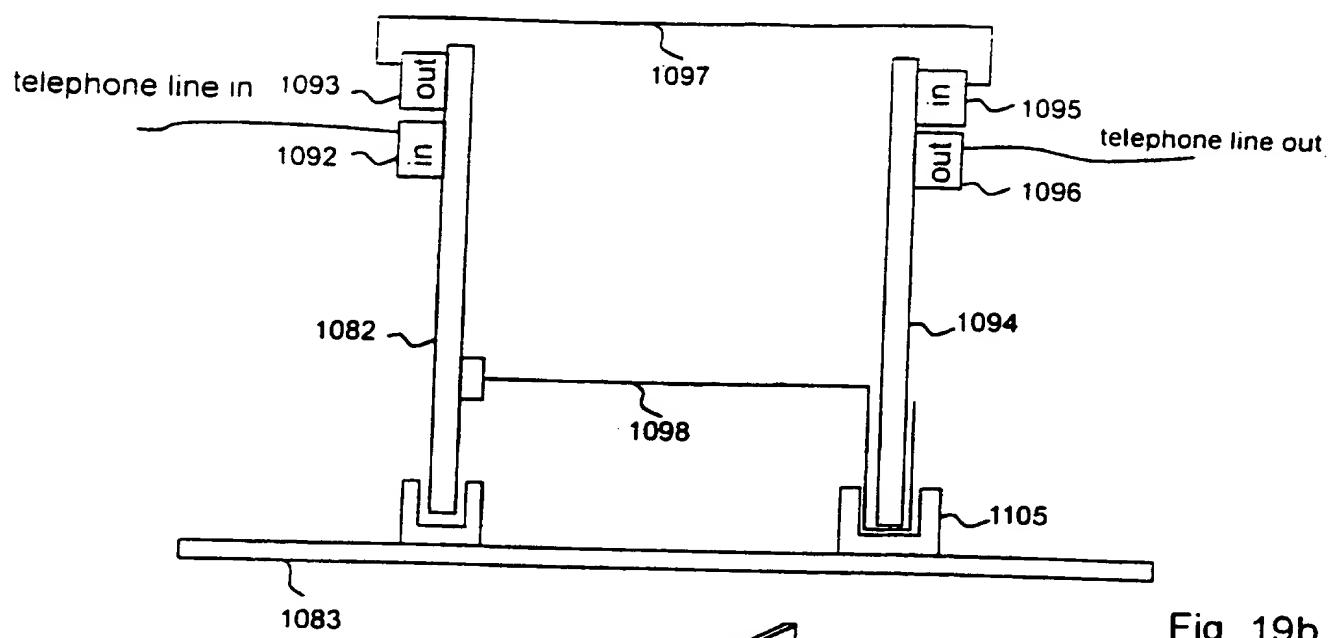


Fig. 19b

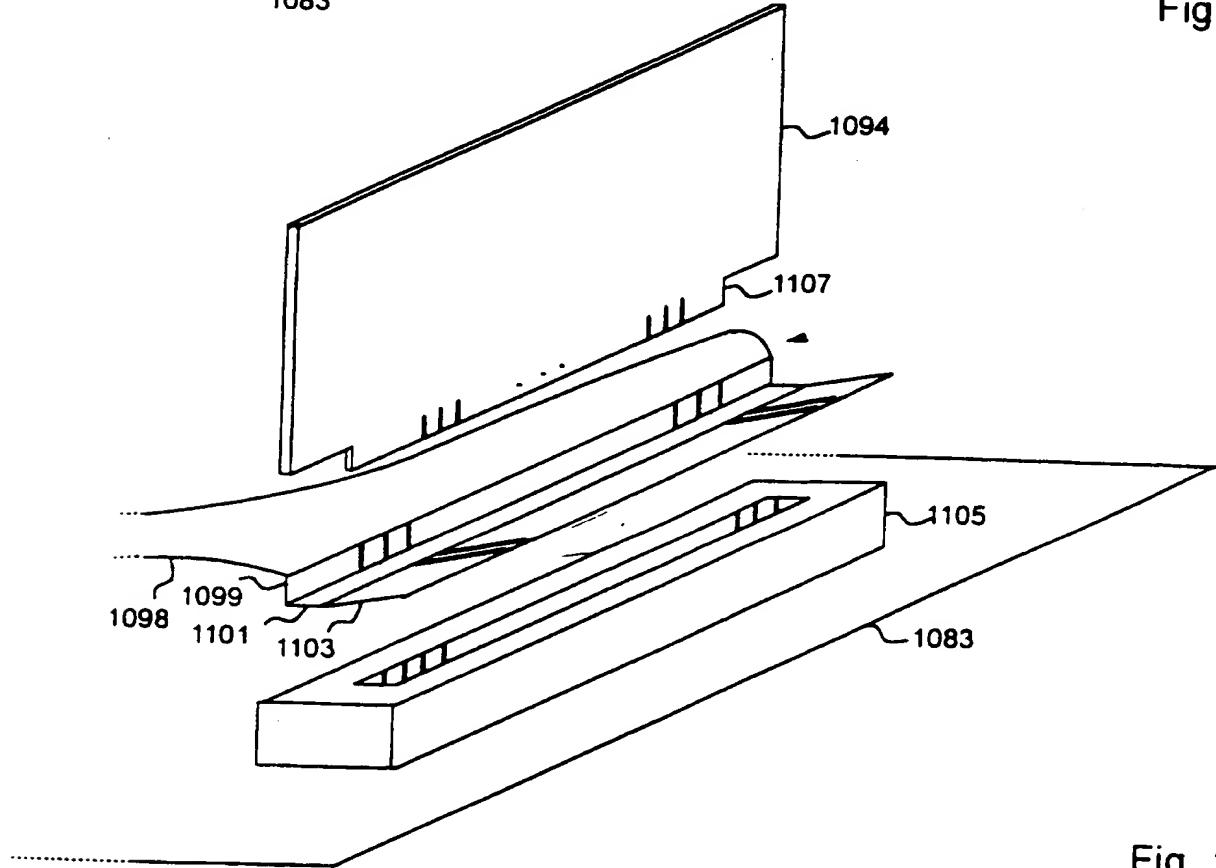


Fig. 19c

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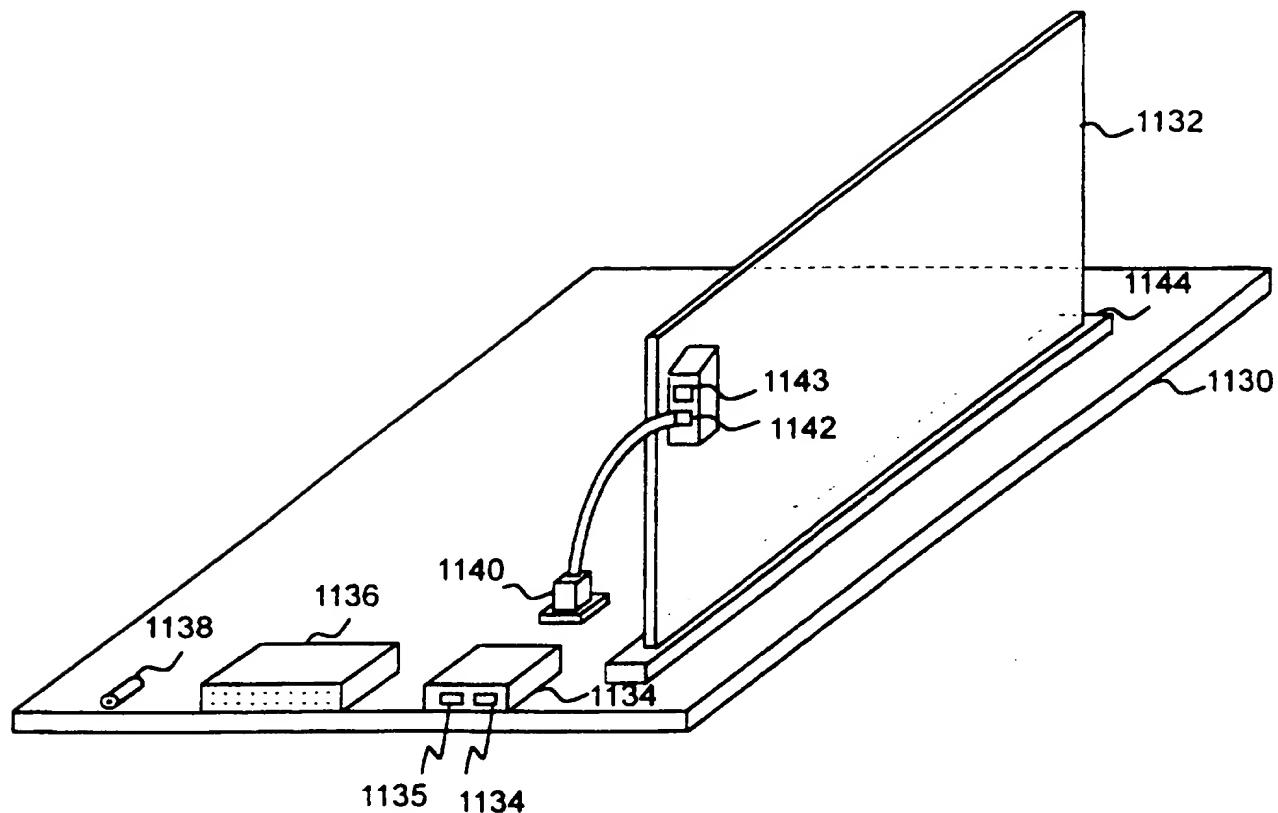


Fig. 19d

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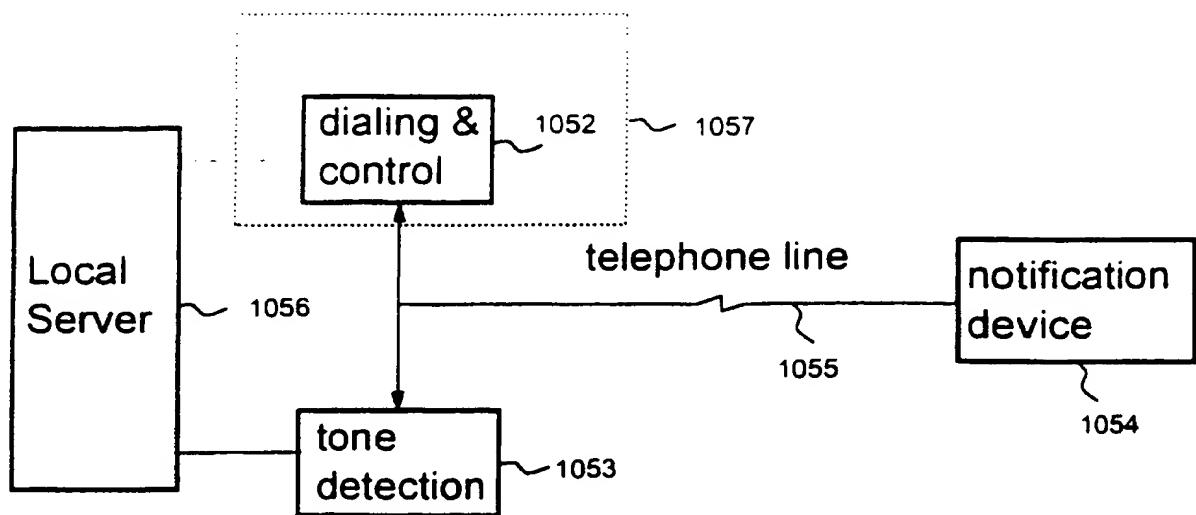


Fig. 20

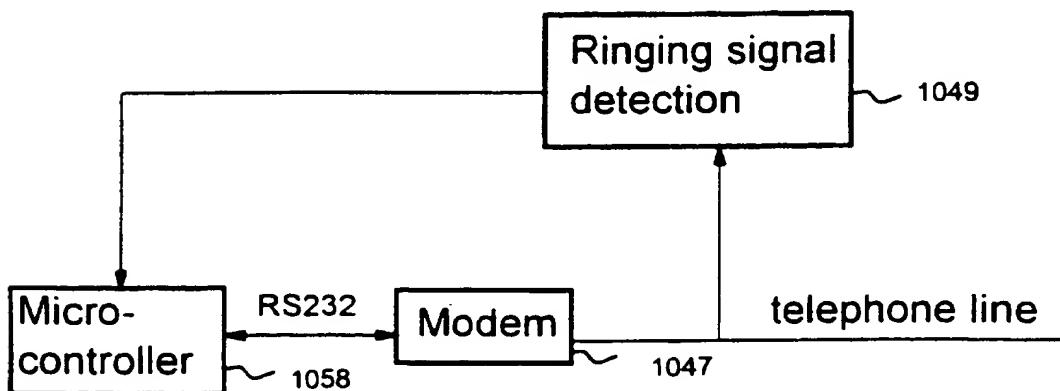


Fig. 21

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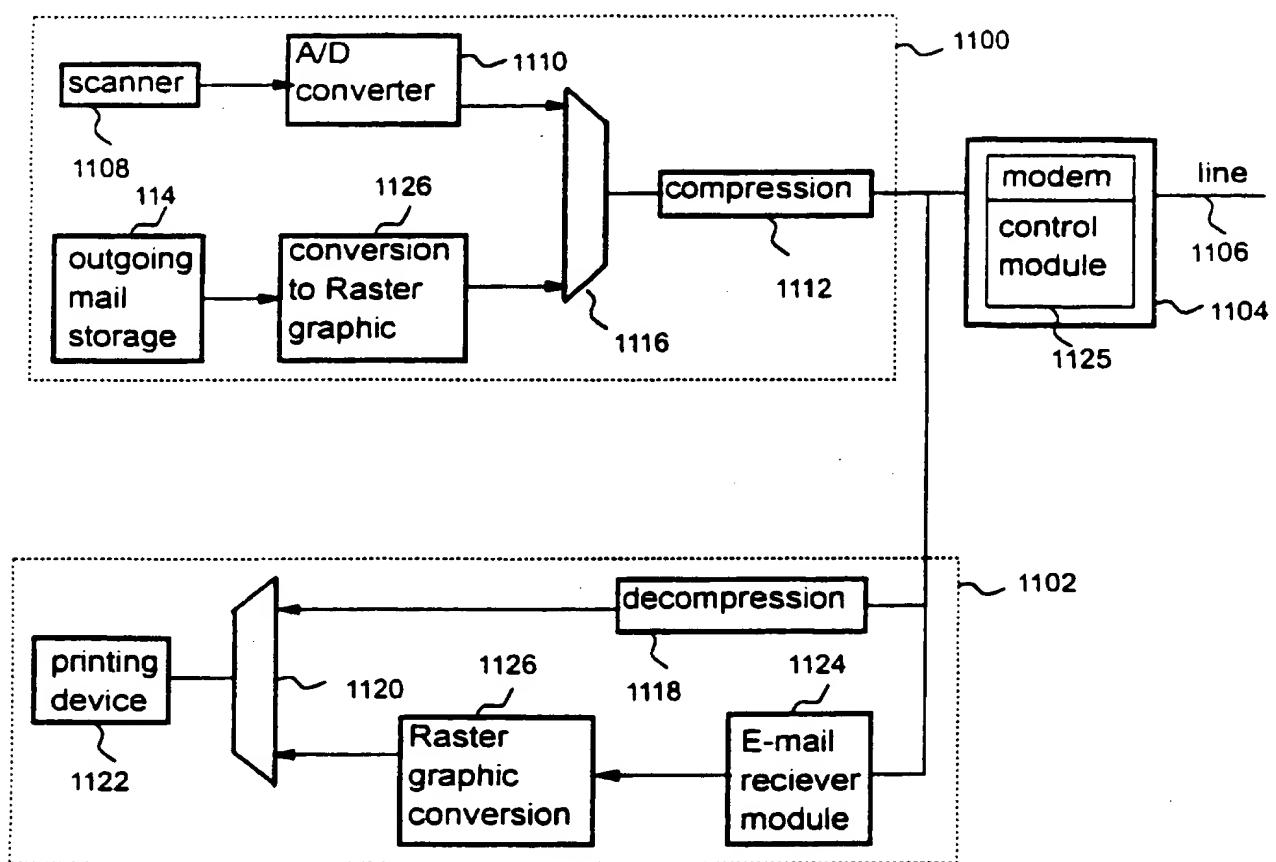


Fig. 22

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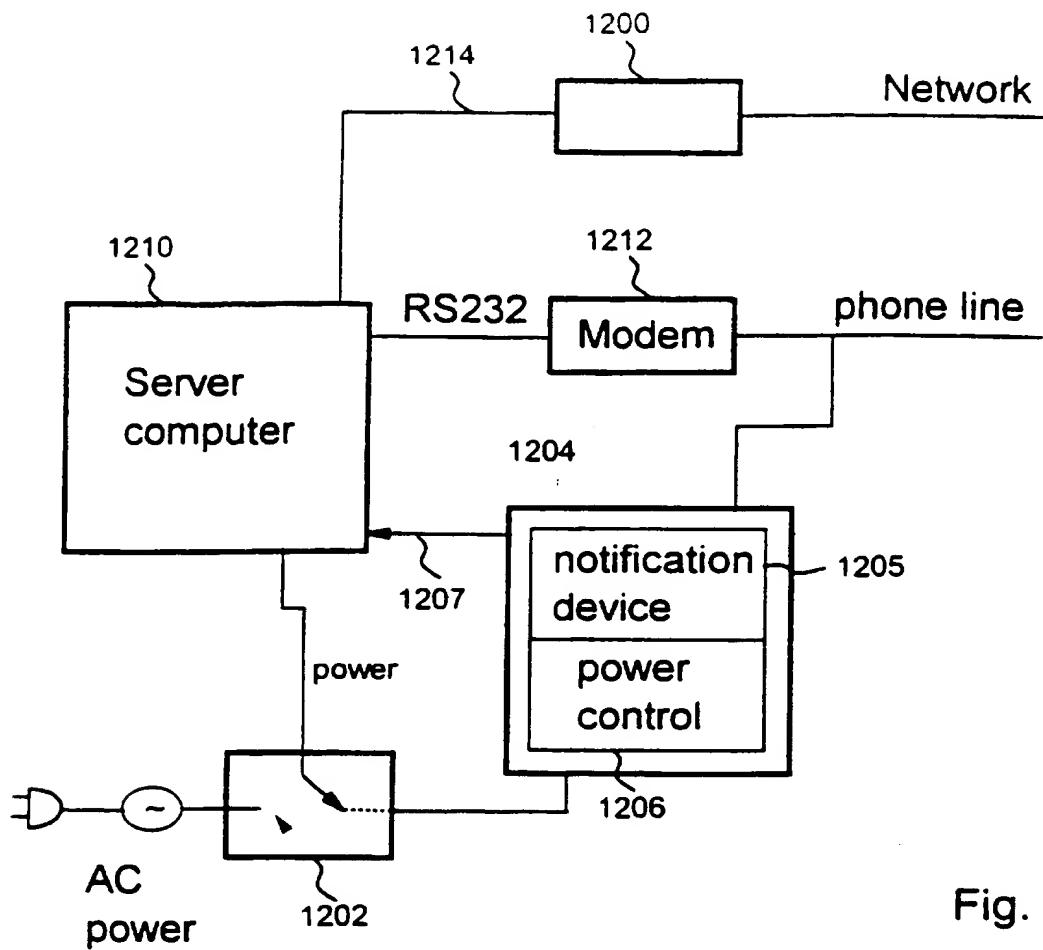


Fig. 23

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US96/11076

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04M 11/00  
US CL :379/96

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/96,90,94,97-99,110,67,88,89,142. 348/6,7,14. 370/61.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,837,797 (FREENY, JR.) 06 June 1989, see abstract, all figures.	1-27

Further documents are listed in the continuation of Box C.  See patent family annex.

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Date of mailing of the international search report

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